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Home Satellite TV

The Magazine of TOTAL TELEVISION

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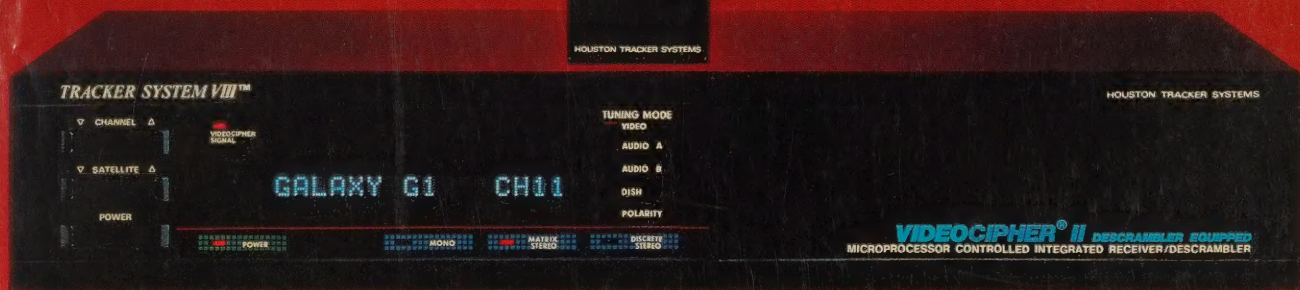


1987 Buyer's Guide

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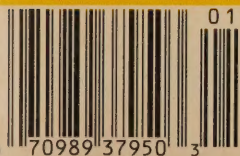
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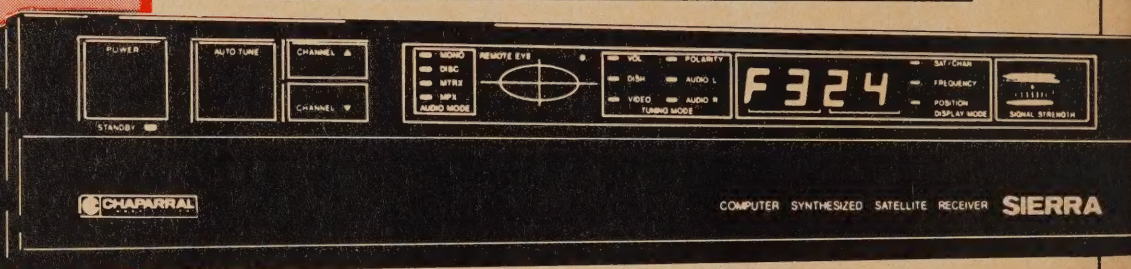
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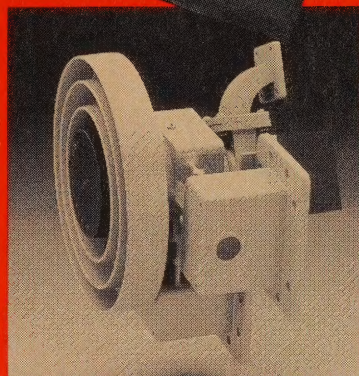
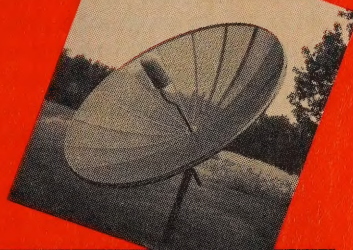
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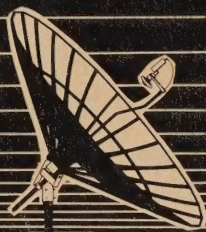
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Home Satellite TV

THE BIG PICTURE

In the excitement over scrambling and the development of (possibly illegal) chips to unlock the descramblers, there's a tendency to lose sight of the true nature of the entertainment revolution that's occurring all around us. (It's another case of not being able to see the forest because of the trees.)

To put it bluntly, while home satellite systems are at the leading edge of the new technology, there are a lot of other important developments also worth noticing. For example, as we pointed out in our September issue, new 35 inch tube TVs are becoming commonplace with 40 inch tube sets already fully developed and ready to make their entrance next year. In our May issue we noted developments in Dolby surround sound that now add the potential of theatre quality audio to home viewing. In this issue we analyze the future and the quality of rear projection TVs where truly awesome viewing screens are possible. And those are just some of the exciting areas. There are new developments in VCRs (such as combining them with satellite receivers, see page 38) and there's even 3-D TV! (See story in our November issue.)

Home satellite systems are only one element. The big picture is that of a home entertainment area centered around the TV. We call this total environment, SUPER TV, and those who enjoy it, VIDEOPHILES.

In the upcoming months we at *HOME SATELLITE TV* magazine are going to bring you increasingly more of the important new developments in the entire field of SUPER TV. Our goal is to inform you, to let you know all that's happening in the new, exciting and wonderful world of total home entertainment.

Bob Wolenik
Editor

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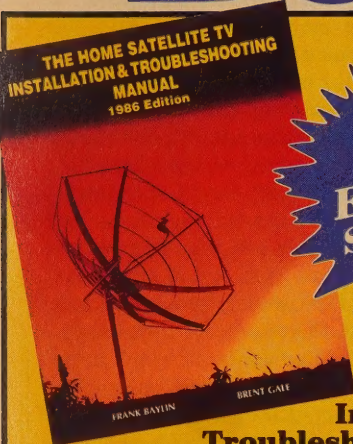
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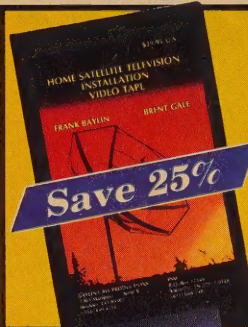
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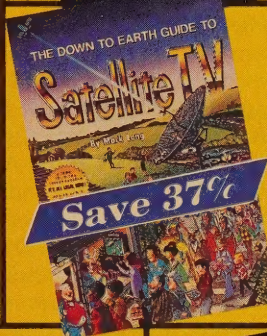
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Black Boxes

Grey Issue and, Perhaps, Black Market

We seem to keep returning to the issue of black boxes, but people seem to keep asking about them and we like to be responsive. The place of these items in the larger marketplace and in the issue of freedom of the airways is a troublesome issue, not only because of the manufacturing rights involved, but also because of the potential for confusion which they represent to the many commercial interests involved in the sale and distribution of entertainment via satellite. They create the possibility of a scramble to protect a market share for the signal suppliers, but also the need to protect third parties in the distribution system as a condition of obtaining access to the programming. This situation can lead to a different type of competition among the producers of the signals and the marketers of the equipment used to send and receive the signals.

But we now have it on reliable authority that not just one, but several entities have created black boxes which can do the job as well as the VideoCipher II.

A legal battle has been joined over the rights to this technology, and there is a struggle to determine whether M/A-Com or Oak will profit from the use by MA/Com of the VideoCipher II technology. These two companies have tried to do everything possible under the law to protect the product of their investment and work from being converted to the benefit of others. The fact that they have had to resort to litigation is an indication of the magnitude of the problem involved in protecting a good idea from dispute

when that idea has a large profit potential. If this is true in the USA, consider what the effect of such ideas when put into use outside USA. For example, there are now many thousands of satellite dishes in use at this very moment in Central America and in Island countries and territories south of the borders (not to mention north and east and west of the borders) of the USA which are ripe for the use of the decoders but are not officially serviced by HBO and other scrambled channels. What will happen to the markets in these areas?

"At some point society must determine who pays for the entertainment which some of us are obtaining by means other than paying per view or per month."

If the Controller of the transponders allows the signal to be received in areas outside the geographic area for which it has contracted, then that company may lose its right to the movie and may be required to refund part of its overall revenues, even though it did not profit by the dissemination of the signal in the proscribed areas. This is a dilemma for the distributors and the producers who have paid for the right to show the film in their contracted areas, but who may also have a duty to protect the rights of third parties in the form of other distribution companies which have contracted for first-run rights in

specific areas. The parties involved cannot allow the dilution of their profit potential by the signal disseminated by the satellite TV industry.

As an example, if Transponder Leasing Company contracts for the right to show the movie "The Other Side of the Fence" for one month on its TLC channel throughout the United States of America and the owners of the film distribution rights might specifically reserve the right to distribute the movie throughout the rest of the world, where it has not yet reached the theaters. The owners rights might also include in their contract a clause requiring indemnification from TLC if the satellite signal is received outside the contracted-for geographical area. Now consider that there may be at that time in excess of 100,000 satellite dishes located in private hands in areas outside the physical boundaries of the United States, and that 20% of these are equipped with decoders which will allow the proprietor to receive TLC's movies. Suppose that half of those TVRO owners tune in to TLC to watch "The Other Side of the Fence." Suppose that the following month a chain of movie theaters contracts for an exclusive first-run engagement of the same movie and suppose that those satellite owners stay away in droves. Suppose that you try to stop yawning now and consider that in trying to determine why his investment was not as profitable as projected, it may occur to the theater owner that the satellite connection had something to do with it. Might he not complain to his film supplier of being treated with such TLC, or even worse, might he withhold a portion of the rental fees. Could he not request that the supplier collect from TLC and anyone else involved with the technology which robbed him of his audience. Would this not create a problem for all concerned? Should I not stop the rhetorical question?

In the subsequent dispute, the numbers of dishes, viewers, decoder boxes and dollars involved will be hotly contested on all sides. TLC will consider the infringement a minor one until hit with a demand for reimbursement of the theater owner for

20,000 or more unsold tickets. TLC's research may indicate that the number was closer to 1,000. Statisticians will be called in; demographics experts will testify; and, before you know it, both sides will have spent a substantial portion of their profits on litigation and dispute settlement. Then they will start looking for the source of all those decoder boxes so they can get their hands on some of the profits generated by that industry. You see how complicated it all becomes.

At some point society must determine who pays for the entertainment which some of us are obtaining by means other than paying per view or per month. And this is the consideration upon which the policymakers will ultimately decide how to regulate this behavior. The fact that you have a large investment in your machine is of little interest to the rulemakers when they get ready to grease the squeaky wheel. They will be concerned with the industry as a whole and with the more lucrative portions of that industry. The US has numerous laws designed to protect the designer of new technology. The US is not the place where these items are likely to reach their first major market. How then can the phenomenon of the black boxes reach maturity of development?

There are countries which do not offer such protection, where industry thrives upon the reproduction of the designs of others without the need for licenses or the payment of royalties. Electronics equipment can be built and sold almost with impunity and can be exported to other countries which, having no large manufacturing base, have no interest in the protection of and furtherance of scientific advancement within the country and therefore no need for patent laws or licenses and have no structure for the protection of ownership rights which would be protected within the continental US and in other countries. Given the location and number of such areas, it is possible to locate a market sufficiently large to support the production of a sizable number of black boxes which could be sold and put to use without ever entering a

Continued on page 77

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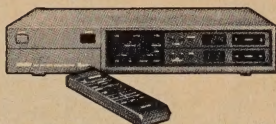
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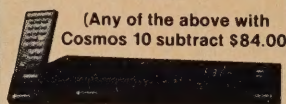
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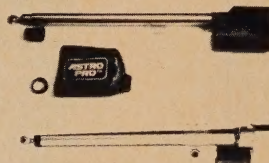
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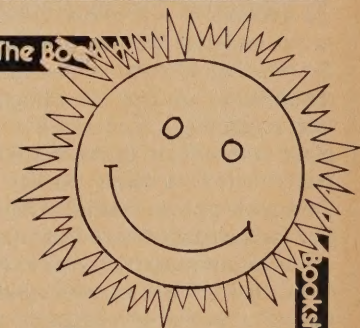
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What's Next?

After Busting Scrambling, Then What?

One of my pet projects for years is a still unrealized ambition. Nearly ten years ago in a monthly electronics journal I was editing at the time, I made the suggestion that the real future of satellite communications lay with small groups of individual users who would discover that satellite communication was the most economical way to engage in their business or hobby pursuits. This was back in 1976 when the only satellite programming available was produced by HBO and CBN, the two pioneers in this business. That was before there was a Showtime or even a Ted Turner.

One of my suggestions was that a major hotel/motel chain, such as Holiday Inns, could create their own network for a combination of entertainment and teleconferencing. I suggested that the day would come when it would be faster and more economical to gather up 100 or 1000 or even 10,000 people with similar interests at a half dozen or 60 or 600 Holiday Inn locations and conduct seminars via satellite than it would be to try to bring the same group of people together at one place at one time. I'm sure Holiday Inn people had the same concept on their own, and that they put in satellite dishes without reading or considering my suggestions.

I can pick up the telephone and order one hour of satellite time for around \$300. That means that I can transmit a television program or lecture or seminar or whatever I wish across the entire United States for \$300 in satellite time and about \$150 in uplink time. So for less than \$500, I can

hand an uplinker a one hour video tape and then see it transmitted from Barbados in the east and Venezuela in the south to Hawaii in the west and Alaska/Canada in the north. Tell me a more economical way to send information for an hour to so many places. You cannot because there is no more economical method.

In that similarity there is marketing strength.

Sales people worldwide have individual talents and individual failings. Some are good at what they do, most wish they were doing something else. People hired to sell shoes in Singapore have no training to sell shoes. Neither do people hired to sell shoes in Binghamton. More complicated products such as computers and appliances are difficult to sell because often they buyer knows more about the products under consideration than the seller.

Information, or a lack thereof, is the key to successful selling or successful repairing or successful retailing at any level. Information is difficult to come by, and retail stores are worldwide-short of trained people because it costs too much to train these people and then have them move on to some other avocation. You cannot hire somebody to sell shoes at minimum wage plus a small commission and then send him or her to school for two weeks or a month to learn how to sell shoes.

I think there should be an entire family of satellite services available which combine the instruction of product understanding and salesmanship

with product display for use in stores all over the world. Let's start with The Shoe Channel. I checked the yellow pages for Miami and counted more than 400 shops that sell shoes. That neglected the department and other larger stores that have shoe departments. Take that number nationwide and there must be more than 25,000 stores that sell shoes. Suppose every one of these had a satellite dish and each day they received an hour or two of formal training on shoe design techniques; why certain shoes fit certain feet and not other feet. If these instructional programs were run *before* the shop opened and after it closed, the personnel would have an hour or two per day to learn their trade inside out. For the cost of paying the employee for an extra hour or two at the prevailing wage scale, the shop owner would have in-house training for his personnel. Now, during the normal business hours, program the channel with buying tips and shoe fashion style shows, each lasting five to ten minutes in length (and then repeated again and again). Set the entire consumer directed program portion to music since the big thing in stores these days is monitors blaring out MTV type music videos. People, consumers, do stop and watch in-store videos. They are influenced by clever videos that tickle their imaginations and carry them away to some fantasyland with their new shoes transporting them on billowy clouds.

If you ran such a channel for 12 hours per day (that allows for time zone overlaps) and spent \$6,000 per day for the satellite and uplink time, you could afford to service 25,000 shoe shops for as little as \$1 per day per store. That's less than \$.10 per hour per store! Between the \$25,000 per day you would take in (\$3 per store per month) and the \$6,000 per day you would spend on satellite and uplink time, you'd have \$19,000 left over to create the day's programming *and get rich. Fast.*

If it worked for shoe stores, it would work for clothing stores, bakeries, used car dealerships, furniture stores, swimming pool and hot tub stores and on and on. Each type of store would re-

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1987 Buyer's Guide

What You Should Know Before Buying Satellite TV

By any standards, the home satellite TV field is a relatively new industry. 10 years ago no such industry even existed. Yes, you could buy a satellite receiver system back then. But it would be a "commercial" system costing tens of thousands of dollars.

Today it's possible to buy a working system, albeit without any bells and whistles, for far less than a thousand dollars. In this field, as the old saying goes, "You've come a long way, baby!"

Unfortunately, the distance covered has not all been a bed of roses. The home satellite field has had its problems and the new consumer should be aware of these before plodding innocently onward toward buying a new system.

When the industry first got off the ground in the early 1980s, most of those who manufactured, sold and installed home systems were basically "tinkers." They didn't do it just for the money (because frequently there wasn't a whole lot of that in it) they did it because they loved it.

Consequently, while the installations and the work were often quite good, the product itself frequently was a disappointment. Early receivers didn't always receive and early dishes sometimes crumpled in the wind or sagged in the sun.

Then came the boom years of '84

and '85. From sales of under 50,000 systems a year, sales blossomed to nearly a million a year. This produced a significant change in the industry.

Manufacturers who had been offering less than adequate products found their returns almost equaled their sales and they either shaped up or disappeared. During this period the product itself, receivers, antennas, positioners and the like became extremely good. Additionally, as new and often well-financed companies came into the field, prices dropped.

Unfortunately, during this period a great many "back of the track" dealers appeared. Manufacturers and distributors were desperate to set up dealers to sell products. Thus almost anyone could become a dealer, often if they only agreed to buy one system! Thus, individuals would buy a system or two and then sell it off the "back of their truck" at a swapmeet or flea market.

As a result, though the products were better, the service was frequently a disaster. And unlike simply buying a new TV set and taking it home and plugging it in, a home satellite system requires a careful installation, particularly the dish.

Thus many buyers were very unsatisfied with the quality of the installation they received and consumer complaints were high.

Then, at the beginning of 1986,

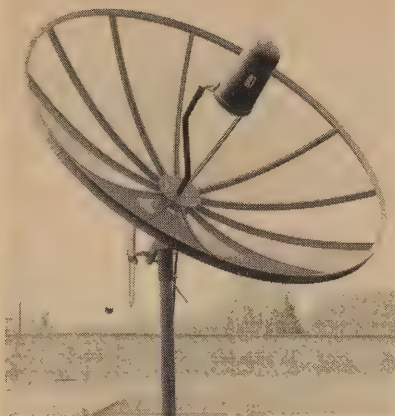
scrambling took hold and sales across the field tumbled. It was a big shake-out. The "back of the truck" vanished as quickly as it had appeared. Additionally, a lot of manufacturers who had produced huge inventories in anticipation of increased sales vanished as well. A lot of 1986, in fact, was spent working off previously manufactured inventories.

Which brings us up to date. In terms of installation, the vast majority of dealers who currently are selling home satellite products are the real pros. These are not the fast buck artists in for a quick high. They are solid dealers who have store fronts and are determined to establish a reputable business. Consequently, the number of complaints that we've heard about shoddy and sloppy installations has plummeted. Today, if you

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A World of Receivers - They are available for any pocketbook and for any need from simple tuners to integrated receivers/positioners/descrambler. Shown (from top), Cincinnati Microwave's Starcast, STS's SR110, Homesat 900 from Scientific-Atlanta and the NU212 from NEC.

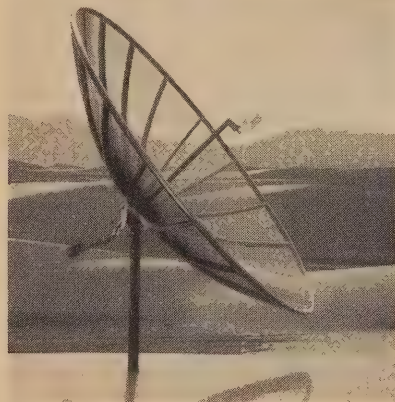




Pico 8-foot black mesh.



Laux Beta 6.5 foot steel.



Houston Tracker 10-foot aluminum.



Kaul-Tronics 7-foot C/Ku band.

buy from a dealer who has a storefront, who's been in business for a few years and who knows what he's talking about, chances are you'll get an excellent installation.

Products also are highly reliable. Today the rule is that you can take it "out of the box" and turn it on and it will work. That doesn't mean that this rule isn't broken occasionally, but then again sometimes new TVs or stereos or computers don't work "out of the box", either. Nevertheless, for the most part home satellite systems manufactured over the past 18 months or so have been reliable.

Finally, there's the matter of prices. While it's true that today you probably can't buy a discounted system as cheaply as you could last summer when the slump was taking its worst toll, chances are the system you buy today is still going to be quite inexpensive. Sales across the board appear to be expanding and, as the field matures, the big electronics companies are increasingly showing their presence, thus forcing the smaller firms to maintain high quality and competitive prices.

Overall, this is an excellent time to purchase a home satellite system. But before you actually make that trek down to the dealer, be sure you know what a home satellite system really is. The following information will describe the parts and what to watch out for.

The Antenna

Antenna size is the usual first consideration. "How big an antenna do I need?" is a typical first-question. The answer is that you need the largest antenna you can (1) place in your yard, and (2) can afford. The antenna performance determines the performance for all of the rest of the system. You will hear statements that you can "trade off" a smaller antenna for a "better LNA" or "better receiver." That is basically an untrue statement and it rings of truth only when the LNA or receiver selected for the first (smaller) antenna was marginal in performance to begin with. We'll see why.

It is very basic that the satellites of interest to most consumers point directly into the center of the United States. People in Kansas receive stronger signals than do people in Maine or California because the satellite signals become weaker around the edges of the United States (called 'CONUS' for Continental United States, within the trade). When signals become weaker, the *only*

answer to improved performance is a larger antenna.

Alas, size alone is no guarantee of performance although certainly a 8-foot diameter dish of proper design will always outperform a 6-foot diameter dish of proper design. But there are also some 8-footers which work no better than (or worse than) some 6-footers. The reason?

A parabolic dish antenna has a very specified, precision form. It is not aesthetic in origin. The dish is a reflector, or signal capturing device. The dish is *not* the actual antenna; a small gadget mounted in front of the dish (called a 'feed') is the *real* antenna here. The reflector is simply like the sides on a giant funnel; the surface of the dish 'catches' the signal and 'pours' or 'directs' it into the small feed part of the system.

It is not possible to easily, and inexpensively ship antennas even six feet in diameter, so the manufacturers break the dish down into multiple parts. This means the installer must assemble those parts into a completed reflector. That's where the precision part comes in.

An antenna in parts, for shipment, must assemble in the precise parabolic shape. Some antennas are poorly designed and even with very skilled people putting them together the parabolic shape cannot be achieved. Other antennas are well designed but they have 'installation tolerances' or 'adjustments' built in and if the installer is not skilled, the antenna assembles poorly. The end result of all of this is that it is possible to end up with an antenna which is more 'egg shaped' than 'parabolic shaped.' If egg-shaped antennas worked as well as 'dish' antennas, we'd call our antennas eggs rather than calling them dishes!

It is difficult for a consumer to 'check on' the shape of a dish since variations of 1/2" or so are not readily apparent to the eye although they certainly are in terms of performance. There is one very simple check you can make of an antenna (at the dealer's shop or at a neighbor's home):

- 1) Take a metal measure and measure from edge to edge of the dish in two directions; from the 12 o'clock position to the 6 o'clock position, and then from the 9 o'clock position to the 3 o'clock position.

You are measuring the diameter of the dish, from edge across center to edge, at two (90 degree separated) points across the surface. If these two measurements do not coincide to with-

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Luxor 1.2 meter fiberglass Ku dish.



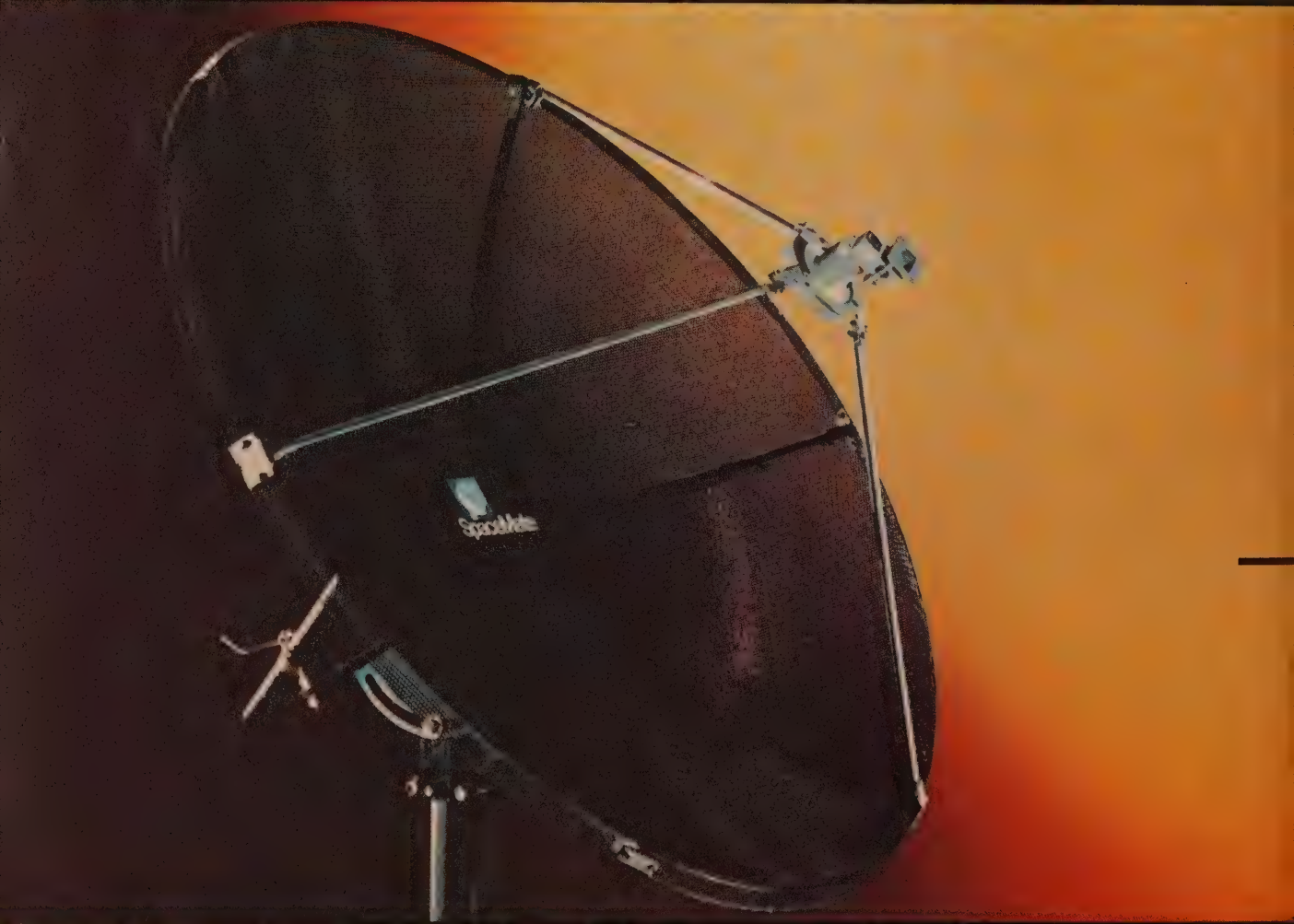
Zenith perforated aluminum



Laux Beta steel dish.

Antennas

MANUFACTURER	MODEL	SIZE	TYPE	PRICE	FEATURES
ASTRA	TIGER 11	11'	MESH		5 YEAR WARRANTY, FEEDHORN INCLUDED
ASTRA	MARK X	10'	MESH		FEED HORN INCLUDED, 5 YR. WARRANTY
ASTRA	MARK V111	8'	MESH		FEEDHORN INCLUDED, 5 YR. WARRANTY
ASTRO	ASTRO KU	10.5'	ALUMINUM MESH		C AND KU BAND, 5 YR. WARRANTY
ASTRO	MESH 10	10'	ALUM. MESH		EASY-TO-ASSEMBLE
ASTRO	ASTRO 36	6'	ALUMINUM MESH		EASY INSTALLATION, 5 YR. WARRANTY
ASTRO	ASTRO 9 SPUN	9'	1 PC. ALUMINUM		POLAR MOUNT, 1 YR. WARRANTY
ASTRO	ASTRO UPLINK		PERF. ALUMINUM		PRE-ASSEMBLED POLAR MOUNT, 5 YR. WARRANTY
ASTRO	ASTRO PERF	6' & 8'	PERF. ALUMINUM		KU COMPATIBLE, LIGHT WEIGHT
AZTECH		10.5'	MESH		HORIZON TO HORIZON MOUNT
BELLIS ELECTRONICS	PERFECT 10	10'	MESH		POLAR MOUNT, CHAPARRAL FEEDHORN, LIFE WARRANTY
BELLIS ELECTRONICS	SOUTHERN SPUN	9'	ALUMINUM		C AND KU BAND, POLAR OR ROOF MOUNT, 10 YR. WARRANTY
BENTLEY	8	8'	PERF. ALUMINUM		C AND KU BAND, POLAR MOUNT, POWDER COATED
BENTLEY	10	10'	PERF. ALUMINUM		C AND KU BAND, POLAR MOUNT
BIRDVIEW		9' & 10'	SOLID & PERF		DUAL LNB, POLAR MOUNT, PART OF COMPLETE SYSTEM
CHANNEL MASTER	PORT A-MOUNT	5'	MESH		SUITED FOR CONDOS, APARTMENTS OR CAMPERS
CHANNEL MASTER		6' & 10'	MESH	\$336-\$592	MONOPOLE, ADJUSTABLE ROOF LEAVE, OR QUIK POLAR
CHANNEL MASTER		6' & 10'	PERF. ALUMINUM	\$307-\$730	"SEE-THROUGH" DESIGN
CHANNEL MASTER		6' & 10'	SMC FIBERGLASS	\$330-\$935	EXTREMELY ACCURATE PARABOLIC SHAPE
CHAPARRAL	COSMOS	8-16'	ALUMINUM MESH		KU BAND COMPATIBLE
CINCINNATI MICROWAVE	STARCAST	8'	ALUMINUM		SOLD AS COMPLETE SET, POLAR MOUNT, LINEAR DRIVE
CONIFER	PARACEPTOR	8' & 10'	PERF. ALUMINUM		POLAR MOUNT, HORIZON TO HORIZON DRIVE
CONIFER	PARACEPTOR	12'	MESH		
CONTINENTAL		10' & 12'	MESH		UPS SHIPPABLE, 12 COLORS AVAILABLE, POLAR MOUNT
DH SAT	MARK III	10'	MESH	\$249	POLAR MOUNT, 3 PIECE ASSEMBLY
DH SAT		2-10'	SPUN ALUMINUM		C & KU BAND, 2 PIECES
DH SAT	5' / 6' DOUBLE RING	5' & 6'	PERF & SOLID		C & KU BAND, QUICK ASSEMBLY
DH SAT		5, 6, & 9'	PERF. ALUMINUM		ONE PIECE
ECHOSPHERE	ECHO STAR	5' AND 6'			PART OF A COMPLETE SYSTEM
ERL	CNC / 10	10'	MESH	\$620	POLAR MOUNT
GENERAL SATELLITE	RX8	8'	MESH	\$269	POLAR MOUNT, PRIME FOCAL FEEDHORN, 5 YR. WARRANTY
GENERAL SATELLITE	RX10	10'	MESH	\$329	POWDER COATED, 5 YR. WARRANTY
HOUSTON TRACKER	HTSX-10	10'	ALUMINUM	\$650	LINEAR DRIVE, POLAR MOUNT, FEEDHORN INCLUDED
JANIL		6, 9, 10, & 12'	MESH		POLAR MOUNT, CHAPARRAL FEEDHORN
KAUL-TRONICS	TRANS-10	10'	MESH	\$450	BLACK OR GREY, PATENTED RIB DESIGN
KAUL-TRONICS	TRANS-7	7'	MESH		C AND KU BAND, AVAILABLE IN PATIO MOUNT
KENWOOD	LAUX 2.0		ALUMINUM		PART OF A COMPLETE SYSTEM, C AND KU BAND
KENWOOD	LAUX 2.8		ALUMINUM		PART OF A COMPLETE SYSTEM, C AND KU BAND
KENWOOD	LAUX 2.8P		PERF. ALUMINUM		PART OF A COMPLETE SYSTEM, C AND KU BAND
LAUX	BETA 6.5	6.5'	STEEL	\$695	C & KU BAND, INCLUDES FEEDHORN, 48 MONTH WARRANTY
LAUX	BETA 9	9'	STEEL	\$950	C & KU BAND, INCLUDES FEEDHORN
LAUX	BETA 9 PERF	9'	PERF.	\$1,150	C & KU BAND, INCLUDES FEEDHORN, WARRANTY
LUXOR	8003	4'	FIBERGLASS		DUAL MODE FEED, FIXED OR POLAR MOUNTS
LUXOR	8004	6'	FIBERGLASS		VARIABLE POLARITY
LUXOR		9' & 10.5'	ALUMINUM MESH		DEEP DISH DESIGN, CHAPARRAL POLAROTOR FEEDHORN
M/ACQM	3.7 M	10'	FIBERGLASS		COMES WITH REFLECTOR, T-BAR MOUNT, AND FEED
M/ACQM	1.8M	6'	FIBERGLASS		AZ/EL MOUNT
M/ACQM	1.0 DBS		FIBERGLASS		DBS, CATV, SMATV APPLICATIONS
M/ACQM PRODELIN	MKII	8' & 10'	FIBERGLASS		"MONOPOD" FEED MOUNTING
NORTHERN SATELLITE			FIBERGLASS		FEED HORN INCLUDED, C & KU BAND
ODOM	CLASSIC	10'	PERF. ALUMINUM	\$425	EASY INSTALLATION, KU COMPATIBLE
ODOM	CLASSIC-II	10'	ALUMINUM	\$395	5 YR. WARRANTY
ORBITRON	ORBITRON 10	10'	ALUM. MESH	\$550	FEEDHORN AND COVER INCLUDED
ORBITRON		7' & 8.5'	ALUM. MESH		POLAR MOUNT AND LNA COVER INCLUDED
PARABOLICS EAST	PE 10P	10'	PERF. ALUMINUM		POLAR MOUNT, PRIME FOCUS FEEDHORN
PARABOLICS EAST	PE 10M	10'	ALUMINUM MESH		C AND KU BAND
PARACLPSE	2.8/3.8	9' & 12'	MESH		C BAND KU BAND, EXTREMELY RIGID AND HEAVY DUTY
PARACLPSE	CD	9' & 12'	MESH		C BAND / KU BAND, COG DRIVE, HORIZON TO HORIZON
PICO	PICO 8	8'	MESH	\$398	POWDER COATED MESH, DEEP DISH DESIGN
PICO	PICO TEN	10'	MESH	\$798	DEEP DISH DESIGN, EASY ASSEMBLY
PICO	PICO KID	4x7			
RAYDX	RAYDX 10	10'	MESH	\$259	C AND KU BAND, POLAR MOUNT
SOUTHERN SPUN MKTG.	SOUTHERN SPUN	9'	ALUMINUM		10 YEAR WARRANTY, C & KU BAND
SOUTHERN SPUN MKTG.	SOUTHERN SPUN	6'	ALUMINUM		10 YEAR WARRANTY, C & KU BAND
SPACE VISION	4500	10'	MESH		PART OF A COMPLETE SYSTEM
STOLLE	SPACEMATE	6'	PERF. ALUMINUM		POLAR MOUNT, C BAND
STOLLE	SPACEMATE	6'	SOLID ALUMINUM		OPTIMIZED FOR KU BAND
STS		10'	PERF. ALUMINUM		C AND KU BAND, PART OF A COMPLETE SYSTEM
SUPERSTAR	789503	10.5'	MESH		GEARBOX DRIVE AVAILABLE
SUPERSTAR	789504	9'	MESH		GEARBOX DRIVE AVAILABLE
TEE-COM		6.5-10.5	ALUMINUM MESH		PART OF A COMPLETE SYSTEM
WAGNER	4/12	10.6"	MESH		NO SCREWS HOLD MESH IN PLACE, SOLID CORE FOR KU
WINEGARD	CK-165	10'	PERF. ALUMINUM	\$450	16 SECTIONS FOR SHIPPING
WINEGARD		4'	SOLID OR PERF		
WINEGARD	CK-1098	10'	PERF. ALUMINUM	\$550	C BAND & KU BAND
WINEGARD	CK-8048	8'	PERF. ALUMINUM	\$450	C BAND & KU BAND
WINEGARD	CK-6018	6'	PERF. ALUMINUM	\$310	C & KU BAND
ZENITH	ZS-1006	6'	PERF. ALUMINUM		
ZENITH	ZS-1010	10'	PERF. ALUMINUM		
ZENITH	ZS-1008	8'	PERF. ALUMINUM		DEEP DISH DESIGN, POLAR MOUNT



in 1/2", immediately be suspicious that this antenna is not performing as well as it could. Either the designer messed up, or, the installer made an error (or both). You will detect 'out of round' antennas in this fashion and that should be a warning to you.

What about the dish materials? Don't those see-through mesh-antennas let the signal slip through while the solid antennas catch all of the signal? Not so fast!

Mesh antennas—assuming the mesh has been properly selected (and almost without exception the mesh comes from one of two national sources these days)—are not 'porous' to satellite signals. Yes, there is air there and yes you can see through. But, the holes are very tiny when compared to something called 'wavelength'; the dimension in space/air of the satellite signals. The mesh represents an 'electrically solid surface' to the satellite signals even though at optic wavelengths (ie. light, what your eye can see), the light passes through.

Without equivocation, a (properly selected) mesh material antenna is no less effective at 'catching' satellite signals than a 'solid' antenna. And speaking of solid antennas, one of the most popular types of solid antenna is the fiberglass design. Now fiberglass itself is porous to microwave signals. You cannot catch satellite TV signals with a fiberglass sheet. So how do they work?

The fiberglass you see is a 'sandwich'; it has a front (top), a middle, and a back (bottom). The middle is a reflective material. One of the most popular and widely used 'middle' layers in a fiberglass antenna 'sandwich' is the same wire screen mesh you see in see-through antennas! The fiberglass? It is simply something to *support* the pliable screen mesh; it is in lieu of a metal framework you see with screen mesh antennas which establishes the parabolic shape for the reflector.

Solid or mesh? - Manufacturers offer a choice. Indications are the solid dishes tend to hold up in heavy snow conditions, mesh performs well under severe wind. Light colors tend to reflect heat, dark to draw it in.

Which leaves us with true 'solid' antennas. They come in aluminum and steel and they come in panels that bolt together, quarter or half sections that bolt together, or they come in single 'spun' pieces. They should be stronger than mesh and more rigid than fiberglass (and more expensive than both) if they have been well designed. But performance?

Remember the tape measure trick? Just measure from 12 to 6 and 9 to 3 (o'clock) and check for dish uniformity. No one design is the best under all situations or conditions and individual antennas in any of these categories will vary from excellent to poor.

Antenna finish?

Most antennas offer a selection of colors. There has been a foolish trend to dark colored antennas in recent years; an unfortunate decision. All antennas sit outside in the sunlight. Dark colors (such as black) absorb more heat than light colors (such as beige). You probably do not want an all black car because everytime you get into it in the summer it is an oven. The same principle applies to antennas even though you don't ride inside of them. But those satellite signals do 'ride' on the antenna's surface and the 'heat' or actual temperature of the antenna surface will affect the performance of the antenna.

Any 'hot surface' has more molecules in motion than a light colored surface. When molecules 'move' they generate 'noise.' Noise is the opposite of 'signal' in a TVRO system and a 'noisy antenna' will produce poorer pictures than a 'quiet antenna.' Where possible, select an antenna color that is neutral; black is the poorest choice of all.

The mount? That's the part of the antenna which supports the reflector surface. Most mounts these days are pipes that stick out of the ground or attach to the side of a building. Most antennas clamp to the pipe with a relatively stout 'jaw' which tightens up like a vise on the pipe. That's important because once the antenna has been 'aimed' by the installer, even small twisting of a quarter inch or so will destroy the ability of the antenna to accurately locate all of the satellites in your sky. So here are some pointers:

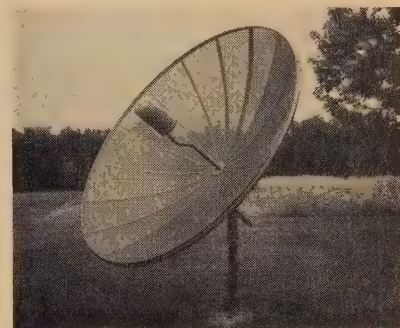
1) Walk up to the antenna and grab an edge with both hands. Shake the edge with your wrists, gently at first in case the antenna is a 'dog.' If the antenna moves with your wrists, it is unstable on its mount and will probably bounce around when the wind blows. That's



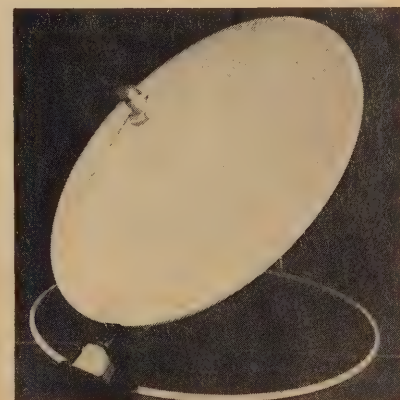
Cincinnati Microwave's Starcast 8-foot.



DH 9-foot spun aluminum antenna.



Winegard dishes in a variety of sizes.



EchoStar portable satellite antenna.

bad news because as the antenna bounces your satellite signal will fade in and out.

2) Now walk to the rear of the mount and dish and grab the top of the pipe firmly with both hands. Push sideways, both ways. Does the entire assembly move again? A 'play' here of 1/4 inch is tolerable but anything more reflects a poor design. You are simulating stresses on the mount at this point, which can come from wind, ice, or just moving the dish with your motorized actuator.

The Actuator

Very few modern satellite systems are sold without an actuator. This is the two-part system which allows you to control the pointing of the dish from inside the home. Some actuators have control boxes which 'stand alone' (ie. are separate) from the receiver while others are built into the receiver proper. The outdoor part is some sort of motor which receives turn on and turn off

commands, as well as 'motor direction commands' from the controller inside.

There are two types of actuator dish movers or 'lifters' available.

1) Linear actuator: This is a long, thin tubular element with a small motor at one end. Inside of the tube is an expanding and contracting 'jackscrew'; literally a grooved shaft which the motor turns.

2) Horizon to Horizon drive: This is a newer, perhaps more elegant approach to moving antennas. Rather than an arm that lengthens and shortens itself on command, we have a half (180 degree) 'circle' which has gear teeth on it. A small motor interfaces to the gear teeth with a set of gear teeth of its own.

Linear actuators fail, but usually because of installer error. Improperly installed, they breathe moisture and water collects at the lowest end of the tube. This water eventually destroys the mo-

tor or the gears and the jackscrew quits jack screwing. Or, the system is installed without 'limits' or 'stops.' As the arm lengthens and the jack pushes the dish higher and higher in the sky, eventually the dish is pointing straight south. If the jackscrew keeps pushing, the antenna's weight grabs the system and the antenna falls (to the east for most installations). This can snap or bend the tube and the jackscrew and you are out of business. Most systems now employ 'limit switches' which the installer adjusts at installation time to prevent this. Some installers forget (or do not know how) to install these limits. There is this rule of thumb:

1) If the linear actuator you are considering does *not* have east and west limit switches, don't buy it. That is an almost certain sign that you are being offered a very cheap linear actuator which in addition to not having limit switches, probably uses recycled inner-springs for its parts.

Price noted is estimate based on manufacturer's suggested retail or 135% of suggested dealer cost.

Receivers		Ku	BLOCK	PROGRAMMABLE	TUNING	REMOTE	STEREO	ACTUATOR	PRICE	FEATURES
MANUFACTURER	MODEL									
ANDERSON SCIENTIFIC	QRCOTAH	NO	YES	NO	NO	NO	YES		\$475	BUILT IN COLOR TV
ANDERSON SCIENTIFIC	ST2010	YES	YES	NO	NO	NO	YES		\$255	AUTO-SCAN, NARROW AND WIDE BAND, AVAILABLE FOR EUROPE
ARUNTA	INTERCEPTOR III	YES	YES	YES	YES	YES	YES			DNA, TYPED PROGRAMMING, ONSCREEN GRAPHICS
ARUNTA	INTERCEPTOR III	YES	YES	YES	YES	YES	YES			ON-SCREEN GRAPHICS, TYPED PROGRAMMING, PARENTAL LOCKOUT
B. E. L. TRONICS	MICROEVE SBR-1450	YES	YES	YES	YES	YES	YES		\$510	MATRIX/DISCREET, STEREO, WIDE/NARROW AUDIO BAND SELECTION
BELL'S ELECTRONICS	DX-800	YES	YES	YES	YES	YES	YES			HIGH RATED GRAPHICS, EASY TO USE
BELL'S ELECTRONICS	C-2600A	YES	YES	YES	YES	YES	YES			PANASONIC QUALITY
BROADVIEW	STAS000	YES	YES	YES	YES	YES	YES			MASTER MICRO-PROCESSOR BASED RECEIVER
CHANNEL MASTER	6135	YES	YES	NO	NO	NO	NO		\$139	SIGNAL STRENGTH METERS
CHANNEL MASTER	6137	S	YES	NO	NO	NO	NO		\$92	PUSHBUTTON TUNING
CHAPARRAL	SIERRA	YES	YES	YES	YES	YES	YES			FULLY PROGRAMMABLE, SEEKS BEST DISH POSITION
CHAPARRAL	SIERRA II***	YES	YES	YES	YES	YES	YES			***HILL FEATURE INTEGRATED VIDEOCIPHER DECODER
CHAPARRAL	CHEVENE	YES	YES	YES	YES	NO	YES			ON-SCREEN GRAPHICS, SYNTHESIZED TUNING
CHAPARRAL	SIERRA	YES	YES	YES	YES	YES	YES			PART OF A COMPLETE SYSTEM PARENTAL LOCKOUT
CINCINNATI MICROWAVE	STAS000	YES	YES	YES	YES	YES	YES		\$2495*	SPECIAL "PICTURE PLUS" CIRCULARITY, COMPLETE DISH SYSTEM
CONFIER	XT-200	NO	YES	NO	YES	YES	YES			AUTO SWITCH FROM SATELLITE TO CABLE OR UHF ANTENNA
CONFIER	XT100	NO	YES	NO	NO	NO	YES			QUARTZ TUNING
DRAKE	ESR2400***	YES	YES	YES	YES	YES	YES		\$1,500	***INTEGRATED VIDEOCIPHER DECODER
DRAKE	ESR2241	YES	YES	YES	YES	YES	YES		\$899	PARENTAL LOCKOUT, 9 PRIORITY VIEW CHANNELS
DRAKE	ESR524	NO	YES	YES	YES	NO	NO			REMOTE ALSO OPERATES APS324 POSITIONER
DRAKE	ESR3245	NO	YES	NO	NO	YES	NO			BOTH MATRIX AND DISCRETE STEREO
DX COMMUNICATIONS	DSB-800	YES	YES	YES	YES	YES	YES		\$999	BOTH SATELLITE AND TRANSPONDER
DX COMMUNICATIONS	DSB-700S	YES	YES	YES	YES	YES	YES		\$575	STEREO DUAL-CHANNEL AUDIO TUNING
DX COMMUNICATIONS	DSB-600A	YES	YES	NO	NO	NO	NO		\$363	DETENT CHANNEL SELECTOR
DX COMMUNICATIONS	DSB-500	YES	YES	NO	NO	NO	NO		\$393	TU-TYPE TUNER
DX COMMUNICATIONS	DSB-500NB	YES	YES	NO	NO	NO	NO		\$249	
ECHOSPHERE	SRD8000	YES	YES	YES	YES	YES	YES			AUTOMATICALLY SEEKS BEST DISH POSITION
GENERAL INSTRUMENTS	990	NO	YES	NO	NO	NO	NO		\$300	AUTO-POLARITY, A/B SWITCH FOR OFF-AIR TV SIGNALS
GENERAL INSTRUMENTS	1000	NO	YES	YES	YES	NO	NO		\$450	CLOCK DISPLAY
GENERAL INSTRUMENTS	9900	YES	YES	YES	YES	YES	YES		\$600	COMPARISON SATELLITE NAVIGATOR, PARENTAL LOCKOUT
GENSAT	CDR412	YES	YES	YES	YES	YES	YES			SYNTHESIZED TUNING, DNR, HEADPHONE OUTPUT
GENSAT	CSA1200KII	NO	YES	NO	NO	YES	YES			COLOR CODED CHANNEL INDICATORS
GENSAT	BSA1200	NO	YES	NO	NO	YES	YES			CAN BE USED AS A SLAVE RECEIVER
HOUSTON TRACKER	SYSTEM U III***	YES	YES	YES	YES	YES	YES		\$1,900	***BUILT IN VIDEOCIPHER DECODER
HOUSTON TRACKER	SYSTEM U	YES	YES	YES	YES	YES	NO***		\$1,050	UHF REMOTE/MATRIX/DISCRETE STEREO/STORES 70 SATS
HOUSTON TRACKER	SYSTEM III/III	YES	YES	YES	YES	YES	YES		\$810	UHF REMOTE
JANITEL	RC2000	NO	YES	YES	YES	YES	NO			FERRITE CIRCUITRY PEAKS SIGNALS
JANITEL	BCR5000	NO	YES	YES	YES	YES	YES			***\$1700-2000 COMPLETE SYSTEM
KENWOOD	KSR1200P	YES	YES	YES	YES	YES	YES	**		SECONDARY RECEIVER FOR MULTIPLE SYSTEMS
KENWOOD	KSR900B	YES	YES	YES	YES	YES	YES	**		SATELLITE/TRANSPONDER DIRECT ACCESS
LUXOR	9900	NO	YES	YES	YES	YES	YES			SLAVE UNIT BUILT TO RUN WITH THE 9900
LUXOR	9993	YES	YES	YES	YES	YES	YES			UNIQUE SCANDINAVIAN STYLING, 3 KEY CODE PARENTAL LOCKOUT
LUXOR	2500A***	YES	YES	YES	YES	YES	YES			***INTEGRATED VIDEOCIPHER DECODER
M/A COM	T-C SPECTRA-SAT	YES	YES	YES	YES	YES	YES			VIDEOCIPHER II COMPATIBLE, PARENTAL LOCKOUT
M/A COM	SPECTRA T-2	YES	YES	NO	YES	NO	NO			PARENTAL LOCKOUT, VIDEOCIPHER II COMPATIBLE
M/A COM	VIDEOCIPHER 11	YES	YES	YES	YES	YES	YES			AUTOMATIC DESCRAMBLING, PARENTAL LOCKOUT, DIGITAL AUDIO
M/A COM	T-1	NO	YES	YES	YES	YES	YES		\$275	PARENTAL LOCKOUT
NEC	NU-313	YES	YES	YES	YES	YES	YES			SIGNAL STRENGTH METER, STEREO
NEC	NU-212	NO	YES	YES	YES	YES	YES			PRESET FORMATS, SLIM DESIGN
NORASAT	JR100	NO	YES	NO	NO	NO	YES			QUARTZ SYNTHESIZED TUNING
NORASAT	JR200	NO	YES	YES	YES	YES	YES			SATELLITE MEMORY
NORASAT	JR300	YES	YES	YES	YES	YES	YES			80 SATELLITE MEMORY, DNR
NORTHERN SATELLITE	NORTHSAT 4000	YES	YES	NO	NO	NO	NO			BUILT BY SONY
PANASONIC	C-2600/PAP-600	YES	YES	YES	YES	YES	YES		\$800	QUARTZ SYNTHESIZER CIRCUITRY, STEREO, FULL REMOTE
PANASONIC	C-2000A	YES	YES	YES	YES	YES	YES		\$559	DIRECT CHANNEL ACCESS, LARGE DIGITAL READOUT
PANASONIC	C-1000	YES	NO	NO	NO	NO	NO		\$251	POLARIZATION FORMAT SWITCHING, EASILY TUNED CONTROLS
PENTEC	RT1300	YES	NO	YES	YES	YES	YES			AUTO TUNING BETWEEN SATELLITES, PARENTAL LOCKOUT
PICO	HR100	YES	YES	NO	NO	NO	NO		\$299	CAN BE USED AS SLAVE UNIT, DETENT TUNING
PICO	HR1000	YES	YES	NO	YES	YES	YES		\$598	MICROPROCESSOR CONTROLLED, AUDIO TUNING CONTROL
PROSAT	330	NO	YES	NO	NO	NO	NO		\$250	CONTINUOUS CHANNEL DIAL TUNING
PROSAT	390	YES	YES	YES	YES	YES	YES		\$610	ON-SCREEN MESSAGES, PARENTAL LOCKOUT, DNR
PROSTAR	XR-1	NO	YES	YES	YES	YES	YES		\$399	SYNTHESIZED TUNING
RAYOV	AX-1	NO	NO	YES	YES	NO	NO			PARENTAL LOCKOUT
SCIENTIFIC ATLANTA	HS900	YES	YES	NO	YES	YES	YES		\$995	AUTO-SIGNAL PERKING, TOTAL PROGRAMMABILITY
SPACE VISION	8900	YES	YES	YES	NO	NO	YES			FREQUENCY SYNTHESIZED TUNING
STS	SA110	YES	YES	YES	YES	YES	YES		\$1,073	AUTO PERKING, POLARITY AND DISH, BUILT IN HV SWITCH
STS	MBS-LSR	NO	NO	YES	YES	YES	YES			PARENTAL LOCKOUT, SKIP-OVER CHANNEL
STS	SA BLOCK	NO	YES	NO	YES	NO	NO			24 CHANNEL MEMORY, 3 MODE STEREO
STS	MBS-SR6	YES	YES	YES	YES	YES	YES			TEMPERATURE STABILIZED BLOCK DOWN CONVERTOR
SUNCOR	SC1100	YES	YES	YES	YES	YES	YES		\$1,295	DOLBY/ON-SCREEN GRAPHICS
TEE-COM	TCR8520A	YES	YES	NO	YES	YES	YES		\$1350*	*INCLUDES LNB, FEEDHORN, ACTUATOR, 10' DISH
TEE-COM	TCR8520A	YES	YES	NO	YES	YES	YES		\$1015*	*INCLUDES LNB, FEEDHORN, ACTUATOR, 10' DISH
UNIDEN	UST2000	YES	YES	NO	NO	NO	NO		\$279	SOFT PUSHBUTTONS
UNIDEN	UST5000	NO	YES	NO	NO	NO	NO		\$379	2-SPEED CHANNEL SCAN
UNIDEN	UST6000	NO	YES	YES	YES	YES	YES		\$499	MATRIX/DISCRETE STEREO
UNIDEN	UST7000	NO	YES	YES	YES	YES	YES		\$1,099	PRE-PROGRAMMED, DNR
UNIDEN	UST9000	YES	YES	YES	YES	YES	YES		\$999	ON-SCREEN DISPLAY, DISCRETE/MATRIX/MULTIPLEX
ZENITH	ZS-3000	NO	NO	YES	NO	NO	NO			LED RELATIVE SIGNAL STRENGTH INDICATOR, ROTATING SKEW
ZENITH	ZS-4000	YES	YES	YES	YES	YES	YES			REMOTE AND PARENTAL LOCKOUT

Horizon to horizon drives place all of the weight of the dish at the gear to gear intersection. That is a potential flaw in the system and unfortunately the systems are new enough that this approach to moving the dish around has a short-term track record. Certainly such a drive, manufacturer rated for a maximum dish size of (say) 10 feet should never be used with a 12 foot diameter dish. In other words, if the drive has been rated for maximum dish size, respect that rating.

Long term, horizon to horizon drives look like the winner here. They can point your dish into a bigger segment of the sky, they are not prone to dish 'overrun' and there are fewer potential-failure-points. The same caveat concerning 'limit switches' applies here, however; make certain the drive has installer adjustable limit switches so you don't run the dish 'off the track'!

LNA/LNB Receivers

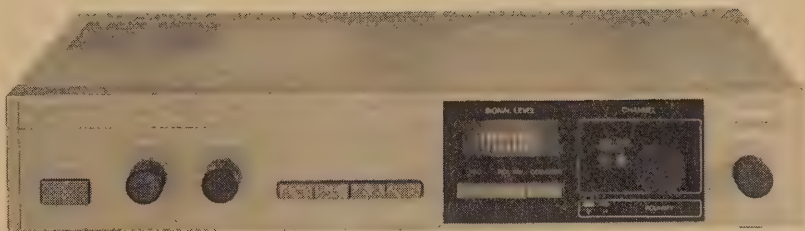
Most modern systems have prepackaged indoor and outdoor receiver segments. The outdoor part may be called an LNB (low noise block downconverter), or simply a downconverter. You seldom have the opportunity to buy one brand of LNB or downconverter and another brand of receiver simply because these two parts are 'tuned' together to make a matched 'pair' of receiver units.

(If you are offered a system which uses one 'brand' of receiver and another brand of LNB or downconverter, it might pay to ask 'why'? Yes, a few receiver suppliers still expect the dealer to shop elsewhere for this outdoor part but most receiver manufacturers now routinely supply this part in the same box as the receiver proper.)

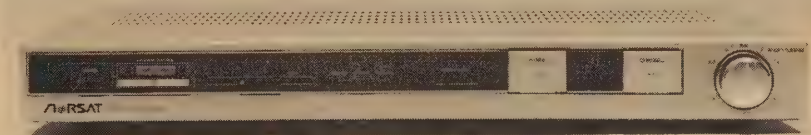
The first signal amplification electronics is important. With an LNB system, this signal boosting occurs inside of the LNB. In a system with its own 'downconverter,' this function occurs in a separate piece called an LNA (low noise amplifier). You shop or select LNA or LNB devices or system parts in much the same manner.

Noise figure and gain are the two important parameters with gain the first consideration. This gets a little complicated for the average consumer but here are the basics of choice:

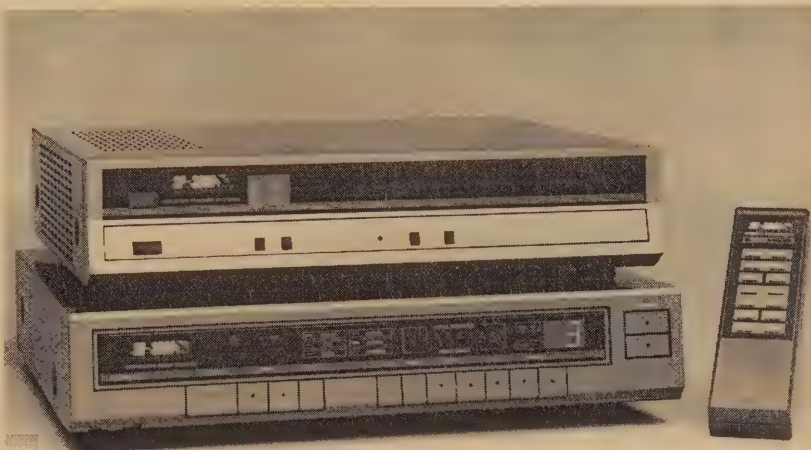
1) The system needs some minimum (always specified in instructions) amount of gain, in the LNA or LNB. Too little 'gain' (measured in dBs)



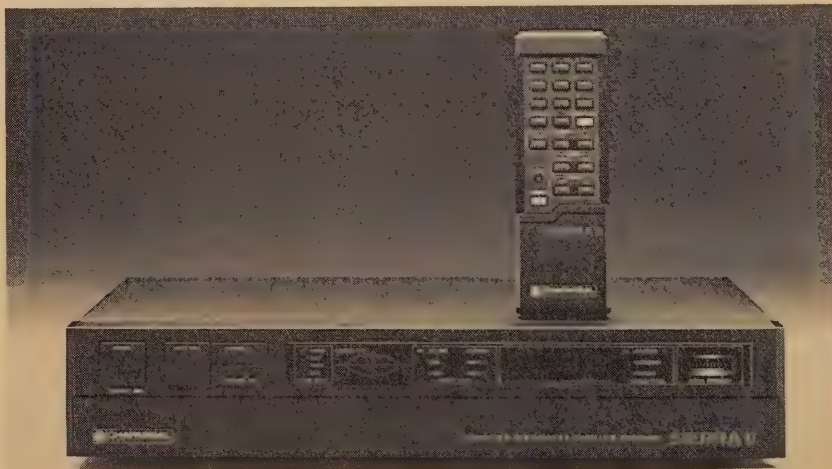
Luxor model 9995 block receiver, "slave" or stand alone.



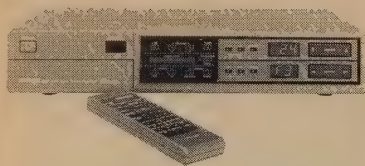
Norsat JR100 block receiver with built in antenna positioner.



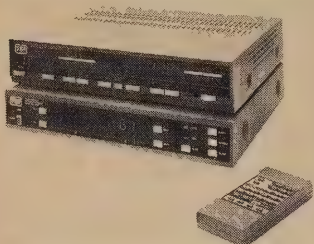
Echosphere SR 3000 receiver with SP-3000 positioner by Houston Tracker.



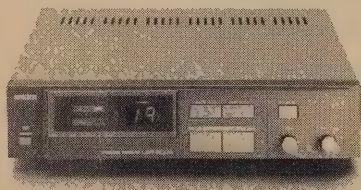
Chaparral's computer synthesized Sierra II receiver with positioner and remote.



Drake ESR 924i receiver with remote.



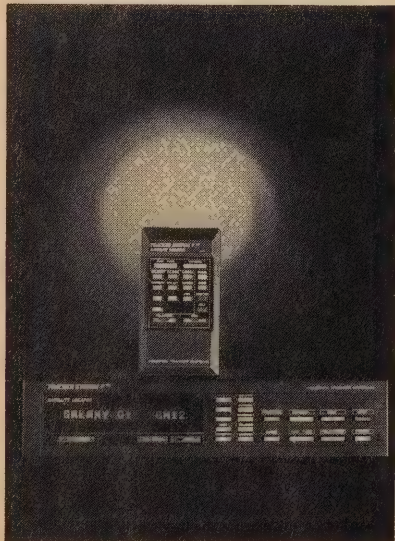
Pico HR-1000 receiver/positioner.



Uniden UST 5000 satellite receiver.



Zenith ZS-4000 with positioner.



Houston Tracker's System V.

means the system has weak, washed out pictures.

(It is also possible with some receivers to have too much gain, but we'll assume the installer knows how to correct for this with a device called a 'pad' or by making the cable run between inside and outside longer.)

2) Once you know the amount of gain required, (to match the receiver) then you make a choice based upon 'noise figure' or as it is also known 'noise temperature.'

LNAs and LNBs are rated in something called degrees Kelvin or ° K. The lower the noise temperature (smaller ° K number) the more sensitive the LNA or LNB. Typical numbers are between 65 and 100 degrees K and the lower the number the more expensive the 'piece.'

"I can sell you a 100° system for this price, or for \$200 more you can have a 65° system" says the dealer. You are being asked to make a decision. But what decision?

There is a belief, prevalent among new (inexperienced) dealers that you can 'mix and match' antenna sizes and 'system noise temperatures.' According to this 'theory,' a 6-foot dish with a 65 degree noise temperature (LNA or LNB) will work the same as a 100 degree noise temperature (LNA/LNB) mated with an 8-foot dish. Do not believe it, even if the dealer seems convinced this is the truth.

Yes, a 65 is always going to be better than a 100. And also yes, a (properly designed) 8-foot will always work better than a (properly designed) 6-foot. But, the difference between a 65 degree and a 100 degree is *not the same* difference as that between an 8-foot and a 6-foot (antenna).

LNA/LNB noise temperature 'trade offs' are real, but they are typically oversold by dealers who parrot something they have heard without taking the time to verify the accuracy of what they heard. Don't be misled by this sort of misinformation; you cannot expect the same quality pictures with a 6-foot as an 8-foot (or an 8-foot as a 10-foot) no matter what electronic options you are offered. *Period.*

You can probably ill-afford to get into a 'debate' with a dealer on this point; you have only our statement to go on and once you've said what we said, that's the end of your knowledge. So use this whole subject as a 'test' of a dealer's abilities and veracity. If he absolutely swears and insists he can give you a six-foot system that will

work as well as an 8-foot (or 8-foot that works as well as a 10-foot) by 'upgrading the electronics,' let that be a 'red flag' to you. Perhaps it is time to walk down the street to the next shop and start over.

Cabling

Before we move inside, let's talk about how all of that outside stuff gets connected to the inside stuff. Cable, or wire is the obvious answer.

There are several types of wiring involved here. First of all, there are those wires which carry the signal from the LNB or downconverter inside to the 'real receiver.' This is a coaxial cable, round, and typically black (black is OK here!). Then there *may be* another piece of wire (which could also be coaxial cable) which carries operating voltage (power) to the outdoor LNB/downconverter. Again, black is OK. Plus, we have some number of wires for the motor drive or actuator gadget. Typically, there are five wires here: two to carry the operating voltage for the motor on the actuator, and three more that function as a part of the motor sensing/position circuit.

Many dealers now use a large combination wire 'bundle' where all of these individual wires are wrapped or sheathed in a plastic type of weatherproof jacket. The idea is that this type of master-sheath can be 'directly buried' in a slot-trench between the dish and the entry point to the house. This is a good concept provided:

1) The sheath is sufficiently tough that rocks and sticks do not pierce the sheath. If holes appear in the buried sheath, water ingresses and then 'rots' the wires inside (because it has no place to go).

2) And, the wires chosen or selected to make up the 'bundle' are high quality wires with adequate insulation. Some cost-cutting wire suppliers use low-grade wire for these bundles.

Another technique is to use individual wires and house them in 3/4 or 1 inch PVC (plastic tubing) which is buried between dish and building. The important thing here is to be sure that both ends are weather protected to insure that rain and other water does not run down into the PVC and then collect at a low spot along the PVC 'run,' causing the wires to rot. A 'rain cap' at both ends (essentially, turning the open ends to face down so water cannot 'fall in') is a good idea.

A third technique is to simply bury

Continued on page 22

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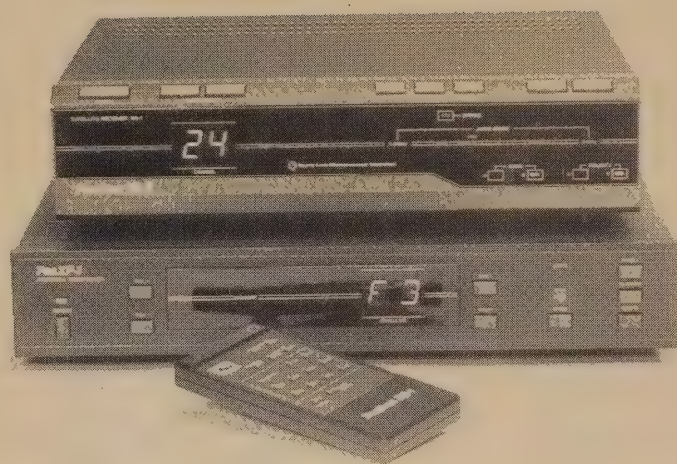
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CITY _____

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for immediate service, call **TOLL FREE 800:358-9997 (US)/800:556-8787 (CA)/707:725-2476 (Others).**



ProStar XR-1 quartz lock satellite receiver and XP-1 positioner.

unprotected wires. This is not a very good choice, obviously.

One other concern relates to the amount of voltage which the dish mover actuator or controller supplies to the motor that moves the dish. Virtually nobody builds a system that requires 110 VAC anymore since running this long an 'extension cord' from house to dish is exceedingly dangerous. Most motors now operate from 24, 28 or 36 volts *DC* and this relatively 'low DC voltage' is considered safer than 110 volts *AC*. Still, even a 36 volt *DC* line is something of a safety hazard and you should make certain your installer appreciates that you don't want someone getting zapped by his wiring.

Finally, all cabled connections must be weather protected. Wherever a wire connects to a piece of equipment out-of-doors, that connection point *must* be sealed against moisture. Plastic outdoor rated electrical tape is one possibility but it is usually not the best choice since very few people know how to wrap such tape to insure that moisture cannot seep in under the tape. Moldable, pliable, sealants such as Coax-Seal™ are better choices since they easily contour to the fitting or connection, and because they do not harden or dry out, you can remove the sealant for a later service call and not ruin the connection in the process.

The Receiver

There is almost nothing which we can tell you to properly and totally pre-

pare you for the receiver selection process. The receiver designers are intensely competitive and each tries to outdo the others in his (and surrounding) price classes to capture market share. Here are some basics:

A) Single conversion: This is a 'family' of receiver designs which dates back to mid-1980. They are inexpensive, difficult to 'break' and give good value for the money. Their primary disadvantage is that it is very difficult and quite expensive to connect two (or more) receivers to the same antenna at the same time with this family of receivers so that each receiver can have independent program/channel selection.

B) Block downconversion: This is the 'modern way' to design receivers and while they still cost slightly more than single conversion, they offer you the ability to add second (etc.) receivers to the same antenna in a manner that allows each receiver to make its own program/channel selection without interfering with another receiver connected to the same antenna.

After those two families of receivers, life gets very complicated.

Some receivers have the antenna controller built into the receiver. Some extend control of the receiver from the front panel controls to a handheld remote control. Some remote controls merely change channels and sound, while others do this plus move the dish and set the various fine adjustments required as you 'change satellites' automatically.

Some receivers have plain old monaural sound, which is perfectly adequate for virtually all of the normal satellite TV broadcasts. Many, however, offer one, two and even three different 'stereo formats.'

Some receivers are plain-Jane looking while others have front panel displays that rival computer displays. Some receivers transfer to the TV screen character generated numbers and letters which tell you, on screen, what channel and satellite you are tuned to, or where your dish is pointed, or how you have your audio adjusted. Others have tiny displays that you can only read up close from the front panel proper.

Let's see what is important first.

Picture Quality: You should not lose grasp of why you are buying a TVRO. You want good quality television reception. This means pictures that are bright and clear, with accurate color tones. Here are some bench-marks 'in the sky':

1) Ask the dealer to show you the following channels, in sequence;

A) The Weather Channel on F3(R) followed by SPN on F3R. Notice the 'quality' of the video on each, especially when they are running a 'tape' on the Weather Channel (between live announcer spots).

These are your basic not-good-video examples. These are also two of the *weaker* satellite channels (anyplace) so you are testing two things here; you are looking for an absence of noise (ie. those black and white dots the dealer calls 'sparklies') and you are looking at the 'quality of the video.' A good system will have no 'sparklies' but the video quality *will be* low.

B) CBS on T302 and NBC on F1R. Again, look at the 'quality'; the video should be so good that you think you can reach out and pick a flower off the screen.

These are two of your 'best of video' choices. If the receiver seems to produce about the same quality of picture (the test is for 'sharpness' and 'detail') on these two service channels as the Weather Channel and SPN, something is 'missing' in the receiver. If you are watching a game show on either CBS or NBC (but more especially on CBS), wait until they show a screen with lots of 'bright reds' or 'bright blues' in it. If the red or blue tones wiggle and there

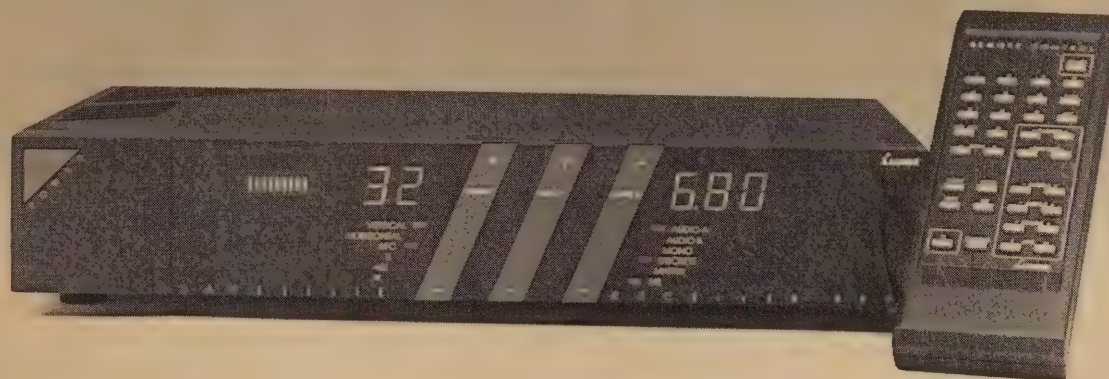
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Panasonic C-2600 satellite receiver and matching PAP-600 positioner.



Suncor model SC 1100 satellite receiver.



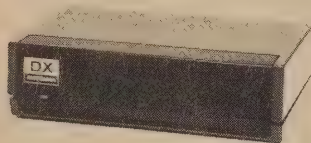
Luxor 9993 C/Ku-band satellite receiver with hand-held infrared remote control.

Additional Products

MANUFACTURER	MODEL	PRODUCT	PRICE	FEATURES
ASTRO PRO	2000	LNB		C-BAND, 55 TO 75 DEGREES
ASTRO PRO	2010	LNB		
CHANNEL MASTER	VARIOUS MODELS	LNB		FROM 70 TO 100 DEGREES
CHAPARRAL	BULLSEYE	LNB		C-BAND/KU BAND, BOTH ON THE PRIME FOCAL POINT
CHAPARRAL	POLARAMP	LNA AND LNB		COMBINES POLAROTOR AND LNA/LNB
CHAPARRAL	DUAL DISH CONTROLLER	DISH CONTROLLER		ALLOWS THE USE OF MULTIPLE DISHS FROM ONE RECEIVER
CHAPARRAL	BULLSEYE	FEEDHORN		COMBINES DUAL FEED AND POLAROTOR
CHAPARRAL	POLARAMP	LNA		COMBINES FEEDHORN, POLARITY SWITCHING, AND LNA
DRAKE	SA24	STEREO ADAPTOR	\$318	ALLOWS STEREO RECEPTION WITH MOST SATELLITE RECEIVERS
DX	D58-400A	ANTENNA POSITIONER	\$265	24 POSITION, PROGRAMMABLE, POWER LOSS MEMORY
DX	D58-300	ANTENNA POSITIONER	\$112	EAST/WEST POWER SUPPLY, FOR USE WITH DX RECEIVER
GARDINER	MICRO LNB-F	B-D CONVERTER/FEEDHORN		C-BAND/KU BAND COMBO
HAMMERBLOW	MESA	ANTENNA DRIVE		LINEAR, COMPLETE WEATHERIZATION PACKAGE
HAMMERBLOW	HAMMERBLOW	ANTENNA DRIVE		HORIZON TO HORIZON OR LINEAR, 4 SENSOR OPTIONS
HOUSTON TRACKER	TRACKER IR	ANTENNA POSITIONER	\$296	UNIVERSAL, INFRARED, PROGRAMMABLE, NO SEPARATE INTERFACING REQUIRED
HOUSTON TRACKER	TRACKERFEED 1	DUAL LNB FEEDHORN	\$363	2 LNBS OFFER 24 CHANNEL VIEWING ON 2 OR MORE RECEIVERS
KENWOOD	KSP-1000	ANTENNA POSITIONER		PRESET UP TO 18 SATELLITE POSITIONS, FOR USE WITH KSR-1000 OR KSP-1000
KENWOOD	LNB-1000	LNB		95 DEGREE MAXIMUM, FOR USE WITH KSR-1000 RECEIVER
LAUX	FEEDHORN	FEEDHORN		OVER 70% ILLUMINATION EFFICIENCY
LAUX	HIGH PERFORMANCE	FEEDHORN		92% EFFICIENT
LUXOR	9769	LNB		KU BAND BLOCK DOWNCONVERTER FOR USE WITH LUXOR RECEIVERS
LUXOR	9726	LNB		C-BAND, 65 DEGREES AND HIGHER
M/A COM	LNSB *7003-13	BLOCK DOWN CONVERTER		COMBINES SCALING, POLARIZATION, AND AMPLIFIER
M/A COM	DPLNB *7003-12	BLOCK DOWN CONVERTER		MULTIPLE RECEIVER ADAPTABLE, WEATHER PROOF
M/A COM	VIDEOCIFER II	DESCRAMBLER		AUTOMATIC DESCRAMBLING OF AUTHORIZED SIGNALS, ENHANCED VIDEO AND AUDIO
M/A COM	T-125	ANTENNA POSITIONER		AUTO POLARITY, 24 PROGRAMMABLE POSITIONS, PARENTAL LOCKOUT
M/A COM	LNB-C	LNB		C-BAND, 120 DEGREES MAXIMUM
NORTHERN SATELLITE	TRANSMIT/RECEIVE	FEEDHORN		FILTERS AVAILABLE
NORTHERN SATELLITE	KU & C-BAND	FEEDHORN		LINEAR POLARIZED AVAILABLE FOR EITHER C OR KU
ORBITRON		ANTENNA ACTUATOR		ADD ON HORIZON TO HORIZON FOR ORBITRON ANTENNAS
PANASONIC	C-LNB-85	C-BAND BLOCK DOWN CONVERTER		95 DEGREES MAXIMUM
PANASONIC	PAP-6000	ANTENNA POSITIONER		PROGRAMMABLE, RED REMOTE OPERATION, 40 POSITIONS
PENTEC	MTI 2500	ANTENNA POSITIONER	\$135	PROGRAMMABLE, "REED" OR "HALL EFFECT", PARENTAL LOCKOUT
PENTEC	2800A	ANTENNA POSITIONER	\$100	MANUAL EAST/WEST, OPTIONAL REMOTE
PICO		FILTERS		WIDE VARIETY OF T/FILTERS AVAILABLE
PROSAT	210	ANTENNA POSITIONER		LED DISPLAY, PRESETTABLE LIMITS, RED REMOTE
PROSAT	ACTUATOR JACK	ANTENNA ACTUATOR		LINEAR, STAINLESS STEEL INNER TUBE
PROSAT	220	ANTENNA POSITIONER		PROGRAMMABLE, OPTIONAL UHF REMOTE
PROSTAR	XP-1	ANTENNA POSITIONER		AUTO FORMATTING, RED REMOTE, PROGRAMMABLE
ROHN		ANTENNA MOUNTS		WIDE SELECTION OF ACCESSORIES
STS	MBS-AA	ANTENNA ACTUATOR SYSTEM		MAY BE OPERATED FROM RED REMOTE IN STS RECEIVERS
SUPERWINCH	2001	ANTENNA POSITIONER	\$175	(ALSO SOLD AS SYSTEM WITH ACTUATOR FOR \$300)
SUPERWINCH	SUPERWINCH	ACTUATOR		1/8 HP MOTOR, LINEAR
UNIDEN	UST-55	KU BAND CONVERTER	\$29	SWITCHED BETWEEN KU AND C-BAND, MUST BE USED WITH SEPARATE RECEIVER
UNIDEN	UST-730	ANTENNA CONTROLLER	\$499	COMBINED ACTUATOR, CONTROLLER AND RED REMOTE, PROGRAMMABLE
UNIDEN	UST-710	ANTENNA CONTROLLER	\$379	COMBINED ACTUATOR, CONTROLLER AND RED REMOTE
WESBAR	EADLE	ACTUATOR	\$170	LINEAR, COMPATIBLE WITH ALL ELECTRONICS, FOR DISHS UNDER 10'



Luxor 9901 hand-held remote control.



DX model DRS-701 remote sensor.

are white and/or black lines in the solid red or blue colors, that's a sure sign of a receiver with inadequate 'definition' (they call it bandwidth in the trade). If the bright red or blue colors show up simultaneously with a modest or loud 'buzzing' sound in the audio, that's even worse.

The solution? Have the dealer show you another receiver. Or, accept that the one you are looking at (and considering) is not the best available.

Audio Quality: The many audio tuning systems available are very confusing to the typical consumer. Basically, what you want is to hear good sound and you should ask to hear it through a hi-fi system speaker package rather than the tiny 3 or 5 inch speaker stuck into the side of the TV set. The sound should not 'snap/crackle/pop,' and if you notice that is does this when there are bright colors on the screen, ask to see another receiver.

Try adjusting the sound carrier tuning *yourself*; it should tune from one sound carrier to another without a lot of whistling and irritating sounds. The best place to test this is on the signal of WGN, found on transponder 3 of Galaxy 1. This channel has as many as 20 separate audio channels on it and only one pertains to the TV picture. The rest are for various radio network feeds; and the quantity of signals on this one channel and the variety of audio formats found here is an excellent test for any receiver. If you can tune the audio controls yourself through all of these audio channels on WGN and find the sound crisp and clean on each one, you have



Houston Tracker infrared programmable satellite antenna positioner.

a good receiver. Poor, noisy sound on one or two of these channels may not be a disaster since they are a real challenge to most home-style receiver systems.

Heat buildup: Place your hand on top of a receiver which has been running for 30 minutes or more. How 'warm' is it? Move your hand around over the full top of the cabinet. It will probably be hotter towards the rear than towards the front.

Heat inside of a receiver is normal. *Too much heat* is not good however since the delicate electronic circuits in the satellite receiver will 'change tuning' as the receiver heats up. This can affect the 'stability' of the receiver's tuning; it tunes fine when first turned on, but you have to retune it again and again after it has been operating for some period of time.

Any receiver which is so 'warm' that you cannot comfortably lay your hand on its case and leave it there 30 seconds, after being on 30 minutes or more, is suspicious. That much heat is going to cause you problems. Some manufacturers have a special problem by trying to power the outdoor antenna moving motor from the receiver itself. The motor uses far more 'power' than the receiver alone and prolonged use of the motor control circuits causes the receiver to heat up excessively. The solution to this is to stick the power supply for the antenna motor in a separate case, inter-connected to the receiver proper through a factory supplied length of cable. This gets the power for the whole system away from the receiver

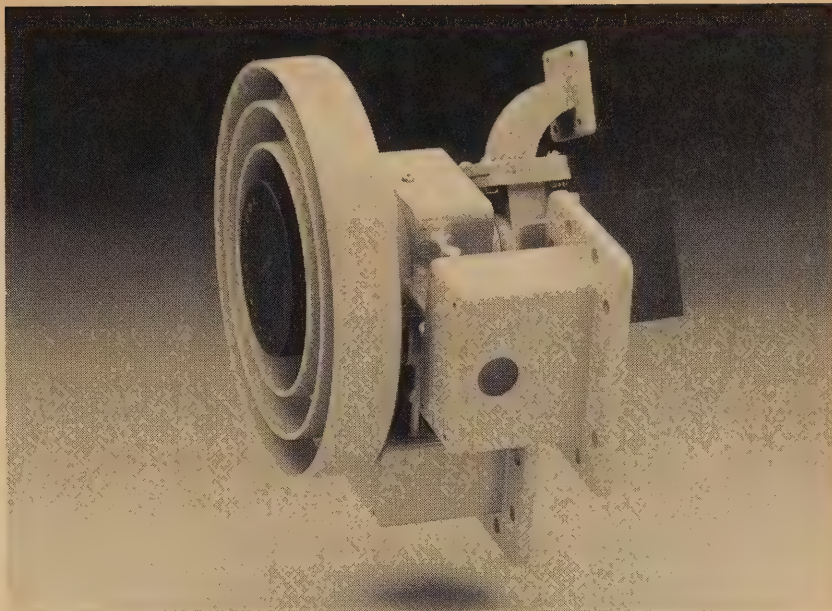
proper, and greatly reduces the heat within the receiver's critical tuning circuits. A receiver which also powers the antenna motor, but retains the powering system for the antenna motor *inside* of the receiver housing should be avoided.

Remote controls: 'Armchair control' of the satellite receiver is 'in.' But be careful. First look at each control on the receiver proper and then locate the corresponding control on the hand-held remote control. Some (in fact, many) of the remote systems are only 'partially remote'; you can change a few of the receiver functions from the easy chair but not others. Obviously a remote that only does *some* of what has to be done is not much of a remote because you will still be hopping up and down from the chair to make adjustments. One of the more common 'oversights' is something called 'format selection.' If you have to push a button or a switch when changing your satellite antenna from say Galaxy to Satcom satellites, but that button is not included on the remote control, or that function is not pre-programmed into the switching procedure, you will have to get up each time you go from MTV to Disney or from CNN to Lifestyles.

Before you select a remote controlled system, operate the receiver fully at the receiver proper and then the remote and stand back to repeat the process. The remote should be as complete as the front panel controls required to change satellites and channels and audio tuning or it is not a full-function remote.



STS SR110 hand held infrared remote.



Chaparral's new center focus dual C-band, Ku band feedhorn.

Rules To Guide You

A satellite TV system is a significant investment; whether you opt for one of the low-end, no-frills systems in the under \$1,000 price, or select a top-end unit costing more than \$3,000. Assuming you are selecting a system which fits your budget, you cannot afford to do it wrong.

1) **New Dealers:** Avoid new dealers. Let them 'learn' with somebody else. Remember that 70% of them will be 'gone' in six months. There is nothing more difficult to get serviced than a satellite system sold by an out-of-business dealer who bought three systems out of the back of a pick-up truck six months ago while some gypsy was crossing your state on the way to Alaska.

2) **Service Shops:** Ask to see and speak with the dealer's serviceman. He should have some semblance of a service shop, and you should ask him if he has enrolled for the SPACE 'Dealer Certification Course'—an educational program attempting to upgrade dealer technical personnel. No service shop, no tools, no work bench are all suspicious.

3) **New Equipment:** There are new pieces of equipment every week in TVRO. The failure rate of new firms offering new receivers, motors, antennas and so on is almost as high as new dealers. Stick with brand names that you can verify have been in business a minimum of a year and avoid brand new models even from established firms since virtually all new models

need 3 to 6 months to get the 'bugs out.'

4) **Warranty:** Ask to see and read the manufacturer warranty statement for every significant part of your system. That includes the antenna, the motorizing system, the receiver and the LNA/LNB if your receiver does not come with these in a package. Anything less than a year (5 years on antennas) is to be avoided; no warranty at all, *in writing*, on the antenna system is a definite red flag! Verify the actual sequence for broken equipment—*where* does it go to get fixed, *will* the dealer provide you with a 'loaner' unit while the repair is being made, *how long* should a warranty repair take?

Some dealers now offer three and five year extended warranty plans. Ask about this and read the fine print carefully. This 'insurance' should cost you between \$300 and \$500 for five years of coverage, and remember, if you have to replace the motorization system on the antenna, that alone could set you back \$500.

5) **Guaranteed Service:** What you 'see' in the dealer's showroom may not be what you can expect in your own home. The problem is something called 'look angle' and 'TI'; terrestrial interference. Both are beyond the scope of this equipment overview but you should simply ask the dealer to 'guarantee' that you will have no interference and no 'signal blockage' of your 'look angle' before you sign anything.

A quality dealer will not hesitate on either count and he may even offer to come to your house to perform a 'signal survey' before he has you sign anything. This is a procedure where he measures to be sure no trees, hills or buildings 'block' your sky-view towards the satellites, and, a test to ascertain whether unwanted microwave signals from telephone company microwave (etc.) transmitters might interfere with your reception. There are solutions to both problems, usually, but they tend to increase your cost of the system and better you know about these costs upfront than after they have poured two yards of concrete and dug up your lawn to bury cable.

Selecting satellite equipment for the 'first-timer' can be a very confusing, and dangerous activity. Do not (repeat: *do not!*) shop just on price. Even the very same equipment with a 10% price differential should not send you automatically to the cheapest guy offering you a system. Sooner or later your satellite system will break (hey, so does your car and your refrigerator; would you buy either of these items from some guy going through town with a large flatbed truck?). And there is more than ample opportunity for a dealer to cut corners on the system he sells you even though he may have represented to you that it is *identical* to the one up the street costing \$300 more.

A home TVRO system is a major investment; buy it carefully. ▀

How Big A Dish Should You Buy?

In the beginning there were only large antennas. Very large antennas. Dictated as such by the FCC. This edict sent down from on high, mandated that thou shall not have any size dish of less than nine meters. Eventually, messages filtered into those in power, that smaller antennas could be used and one could still receive an acceptable picture. So, the great parabolic rush began.

When the FCC released the pendulum to swing, few knew that it would swing so far. Now we have four foot dishes that actually work. The pendulum has swung wildly at times depending on who was swinging it. The arguments of large versus small antennas are many and can be complex and confusing. When it is all said and done, the proof is in the picture. But, the picture is not completely clear for the future regarding antenna size and as much as we may not want to think about the future we must. There has been a trend back to larger antennas and we will examine some of the reasons for that trend.

The dividing line between what constitutes large vs. small wavers somewhere around the nine foot mark. Most of the literature you see says large is 10 foot or better and small is 8 foot or smaller, leaving nine foot somewhat in limbo. However, I'm not here to decide what the "experts" can't. This business of satellite delivered television is an ongoing, unsettled process. Let's just get to what we already know and think we already know.

This we know. Probably the primary reason to buy a large antenna is that you are not within an area that receives a strong signal from all of the satellites. This pattern of signal strength is known as the footprint. Most of the major satellites are aimed at the center of the U.S. and how that signal spreads out from there is the design of that satellite's footprint. The farther from the

center of that footprint, the larger the dish you need.

This we know, of concern to small antenna owners are two degree spacing of the satellites and dual band use.

If you examine a chart on future satellite alignment, you will see that the satellite belt is going to get very crowded. Very crowded, indeed. The concern here is that adjacent satellites may interfere with each other. It may happen in some cases and may not happen in others. It will depend upon your own geographic location and on the way the particular signal comes down from the satellite. The rule of thumb is that a larger dish will work better than a small one because it has the ability to reject the interference from the adjacent satellite. Time and actual use in that situation will tell the story, but we do know large ones will more than likely work, but we don't know for sure about the small ones.

If you want to use your system for dual band (both C-band and Ku-band) you can use a small dish...for one or for the other, but generally not both. There just isn't the surface area needed to run at the same time. The weight of the feed and the Ku-band LNB and the C-band amplifier may be too much for some button hooks on small dishes. Some people will be in the same situation with Ku-band that others are in with C-band. That they are not within the footprint of the desired signal and that they need a larger dish to receive quality signal levels.

We are also finding that using a larger dish strictly for Ku-band isn't overkill. Although dishes as small as 32" can show a wonderful picture on Ku-band, larger dishes are needed to really gain the full benefit of the technology. Holiday Inns are going to Ku-band and they are installing 15 foot antennas.

Another reason to purchase a big dish is due to the fact that satellites have a life span. The new one's have a possibility of surviving until the ripe old age of ten or twelve. Some present ones are already two to six years old. Take SatCom F3 for example. It is about four years old and within two years the strength of the signal dropped measurably. It could be seen in the picture received. On a larger antenna that loss is less discernable.

The next reason to own a big dish has good news-bad news connotations because it has to do with which way the wind blows. A dish is very much

like a sail in the respect that it catches wind. Almost every antenna I have seen has a certain amount of wind wiggle. On a big dish there is more room to have a certain amount of this wiggle without it affecting your picture. But, the bigger the dish the more wind it catches. Here is where the importance of having a good, substantial mount comes in. It can help offset the wiggle of the wind to sustain an acceptable picture.

On the flip side there are reasons beyond our control that call for a small dish and I recognize that fact. Some areas zone out large dishes, some people do not have the space to put one in. Some installations call for a roof mount or for it to be on a long pole and it is difficult to use a large dish in those applications. Some folks just don't want a big dish sitting in their yard for esthetic reasons. And then, there is the cost factor.

Here again is a good-bad news situation. Many of the small dishes are less expensive than larger ones. But, you have to use better and more expensive electronics to get comparable, quality signals from the small dish. You can't stick on a 100 degree LNA with a \$189.00 receiver and expect a decent picture on each and every transponder. By the time you spend the extra bucks on the electronics, you may have the price of a larger antenna with less expensive electronics. So, there is a trade-off.

Many people purchase small dishes because they can install the system themselves, thus saving some money in the process. Smaller dishes are also easier to aim. The bigger the antenna the more sky it sees making it more difficult to line up. Once aimed though, a large dish gathers more signal.

Another factor is snow and ice loading. When a small dish fills up with snow it cuts the signal faster than when using a larger dish. But, a larger

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Small or Big? - That's the question that many consumers are asking themselves when it comes to making a dish decision. Small offers Ku-band opportunities, but large may offer C/Ku band flexibility. For straight C-band, 6-foot may do in the center of the country, but 9 feet or larger is recommended at the coasts. Dishes shown are from DH manufacturing.

Sizing Up **ANTENNAS**



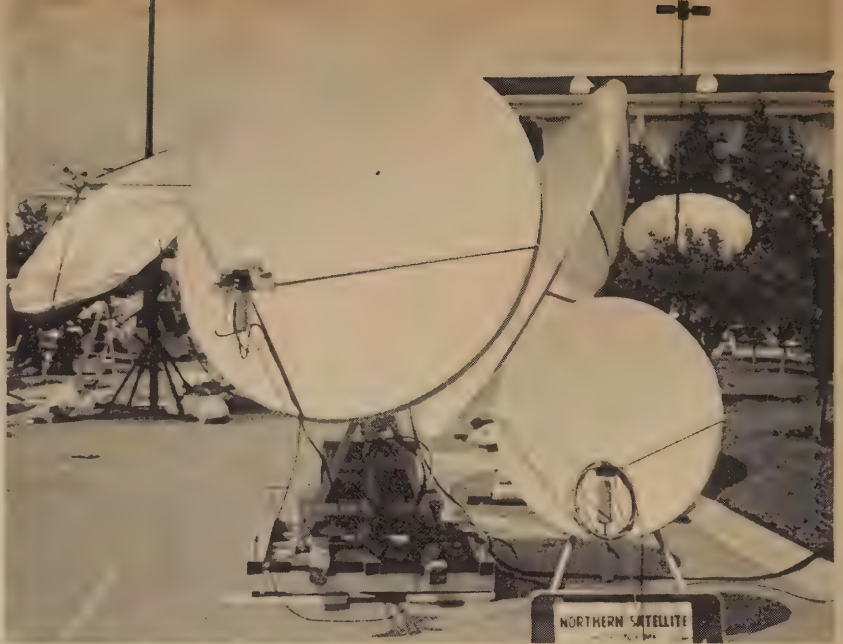
Antennas

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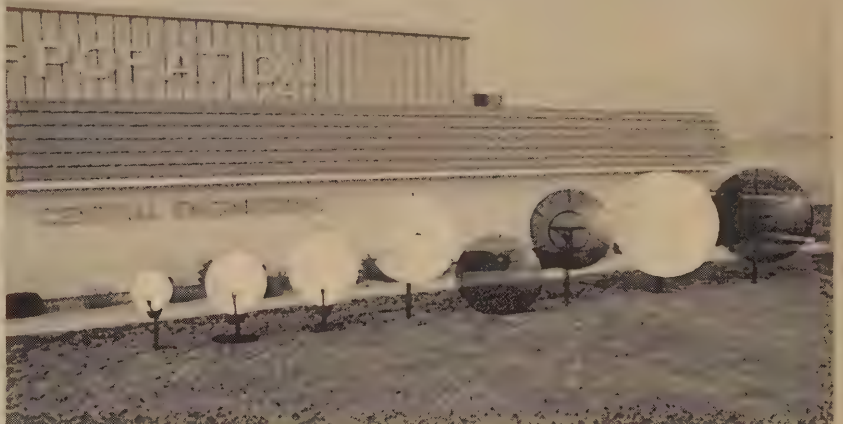
antenna catches more snow and ice. It also makes the choosing of a dish mover or actuator a more critical task because you want one that can handle the load without bending the mover or something else adverse happening.

For maximum use of a system and for fewer worries about the future, a big antenna is better, even though it is argued that the next generation of satellites will be high powered and the signal will be such that you won't need a large dish. Perhaps. But if a small dish works well, think of how well a large one will perform. However, there is some consolation for small dish owners. If small dishes do have problems with C-band in the future, you can turn your small antenna into a Ku-band dish. In the same breath though, it is easier to trade up in electronics than it is to trade up in antennas, so beginning with a large dish is something to think about.

In the final analysis, I believe we will find that small antennas will have their own niche and small dish owners don't need to rush out and get rid of theirs, but it's hard to knock the fact that the bigger the dish, the more versatile it is and the less likely it is to become obsolete. So, if you haven't purchased a system yet, take into consideration what has been discussed in these pages. Weigh your own situation, look to not only the present, but also to the future because you are making an investment in the future. ▀



Offset Dishes - Small, they can be a good choice for Ku band.



Pick Your Size - Manufacturers offer a wide selection.



Which Size Is Best? - A lot depends on signal strength in your area - Cosmos dishes for Chaparral.

BUYING THE RECEIVER

*Your Need Guidelines In Order To
Make The Right Choice*

BY TIM OLIN

This story was originally about purchasing the right receiver for your new satellite system, but it could have easily turned into one about how to get confused when you become too well informed about a subject. It's that cliché about finding out the more you know about life, the more you find out you don't know much about it. Have I got you confused yet? I'm trying. Let's get right to the subject I'm trying to make more clear.

It's all involved in the decision-making process. As I see it, you have three ways to make a choice when you go shopping for anything. You can gather all the information up yourself and make the choice all by yourself or you can let your friendly, neighborhood gadget dealer make the choice for you or you can make the decision together.

You want to buy a home satellite TV system, but you don't know what receiver you want to buy. Let's begin with a little list of the possible features you might incur on your search for the perfect receiver for you.

1. Skew is very important to have for adjustment of the polarization device as you track across the satellite arc. To get automatic skew you have to spend more money. It is something you can do yourself though, on either the receiver or on the remote. There are a few receivers that have remote control, but do not have a skew adjustment on it. My question is "why have all that automation and not include an important adjustment such as skew right on the remote?" Look for it when browsing through receivers.

2. You can purchase receivers with automatic polarity or with manual switching. Again, when you go automatic you spend more money. It truly is a nice feature, but one that can be done without to save some money. Automatic does take away some of the confusion that number (5) the format, or the Weststar switch brings us.

3. Scan is something that really comes into its own when you don't have a programmable actuator or don't have an actuator at all. It does help to find a satellite when searching through the arc and when trying to find a transponder that may only be on occasionally. Most of the newer receivers have scan. Some have just one speed while others have a slow and a fast scan. Essentially the faster scan is to aid in that search for the satellite or transponder.

4. AFC locks onto the strongest signal it can find and helps keep that signal. In many receivers that are programmable you have to remember to turn the AFC off while programming.

5. The format or Weststar switch is used to help keep us straight about what particular channel we are looking for in our program guide. For example, transponder or channel one on Satcom F3 is on a vertical polarization, but on the satellite next to it, Galaxy 1, channel one is on a horizontal polarization. So actually, one is two and two is one...or is it? This is where total automatic polarization is nice, but this whole format business is within grasp of most people, except maybe me. So don't worry too much about it in your decision.

6. Parental lockout is particularly nice for keeping young children away from the channels you don't want them to be viewing. I would venture to guess that there are less than 15 percent of the receivers on the market that have this feature. The common way to lockout problem programming is by locking out the entire satellite the offending channel is on. If you want the ability to lockout particular channels, but not the entire satellite, your choice of receivers narrows.

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Buying The Receiver

Continued from page 29

7. Fine tune comes into play on some receivers, but not all of them. It is handy to have it on both the remote and on the receiver because it is crazy to have a remote control, but yet you have to get up to fine tune on the receiver. We will see less fine tuning as we see more quartz lock tuning.

8. Channel up and down is simply that, the way to tune your channel from one transponder to another. Some receivers have a continuous tune knob while others have what is called detent or click-stop tuning. I've found most of the continuous tune type to be somewhat hard to keep tuned just right. Those kind are generally less expensive, but I don't think the savings are worth it. Being able to know exactly where your transponders are is worth the few extra bucks.

9. Direct channel access without going through each and every channel is becoming more and more popular. It's one of those features that appeals to some and to others it doesn't matter. It's your personal choice here.

10. A programmable receiver is best for those who have trouble with understanding all that is involved with this satellite TV business. If you get confused about format, about skew, about AFC and all that related stuff, the programmable receiver is the one for you. However, in the same breath it can be more confusing unless it truly is "user friendly." Make sure you are comfortable with how it is programmed and how to use it before buying it. It's more money. I've seen some cheap models that are far easier to use than some of the so-called programmable ones.

11. The use of on-screen graphics is fairly limited. It makes the receiver very friendly, but you have to spend a few more dollars to obtain one.

12. Video invert is not really used much right now, but it is used extensively when receiving Ku-band. Some programming is scrambled by changing the way the video is received. A flip of the video invert switch clears up the picture.

AUDIO

1. Volume up and down comes on some receivers and not on others. More and more receivers with remote control are starting to include this feature. It is not that big of a deal if you already have a remote control TV to begin with because you can use the volume on it, but it does eliminate having to lug around two remotes.

2. Narrow and wide band audio is a must if you want to get the total use of the audio portion of your system. There are radio stations that piggyback on the video satellite signal and are called subcarriers. Some of those signals are on a portion of the audio band that is reachable only by narrowing down the receiver tuning. That is where the narrow/wide band switch comes in. When you can't find one of these subcarriers on wide band then you go to narrow band to pick it up. If you have remote it is nice to have the switch on the remote as well as on the receiver.

3. Variable tune on a receiver is the feature that allows you to search for the subcarrier. Some have this right on the remote as well as the receiver and the benefits are obvious. Various programmable receivers allow you to program in the audio part as well as the video part.

4. Stereo sound off satellite is coming on strong, but is of little value to you if you don't have a stereo television or a stereo amp and tuner. It adds to the price and some receivers that call themselves stereo are not. They are just a glorified mono. Those receivers having stereo have two or



three ways of going stereo; matrix, discrete and multiplex. Unless you are an audio buff with all of the equipment there may be little value in purchasing a stereo receiver.

5. An LED readout for the audio is really handy, if you have the money to buy a receiver with this feature on it. It makes searching for that elusive jazz program or classical program a whole lot easier. Some receivers have this capability with on-screen graphics which is dandy to have, but adds to your cost.

Here are some other things to consider when purchasing a receiver. Do you want to be able to add on another receiver without a great deal of additional cost? Then block-downconversion is the path to take. Block-down is also less sensitive to extreme temperature changes. I won't get into what block-down is because that is a whole article in itself. If you choose this route to go, it is going to be a little more expensive than the traditional 70 MHz receiver because you also have to buy the block. Pay attention to what frequency the receiver is in. Some such as DX, Avcom and the STS LSR are not in the 950-1450 Mhz range that most block receivers are in today. It's no major problem, but you have to be sure that when you add another receiver you purchase the proper splitters, blocks and a receiver that is in the same frequency.

Is it decoder or scrambler ready? Scrambling is here and having a receiver that is acceptable to a decoder will save time and money. But, if you don't foresee ever purchasing pay services you won't need it. However, who is to say what will be pay and what won't be in the future.

Having a meter on the front of the receiver makes fine tuning a channel or a satellite in much easier and most receivers have them. If it doesn't then I would look around for a comparable one that does. This too, is no major deal, but why not have it?

The move now is to have the receiver be ready to use on either Ku-band or C-band. It does add a little bit to the cost, but I foresee it as becoming something that will be standard. Some will use an a/b switch to go from C to Ku and others have cable ports ready for use. Check it out.

Having an a/b switch built right into the unit makes life easier, but is not entirely necessary. This gives you the ability to go from receiving the satellite signal to receiving your local off air channels. Some remotes have them while others are on the receiver itself. If you want this feature ask about it.

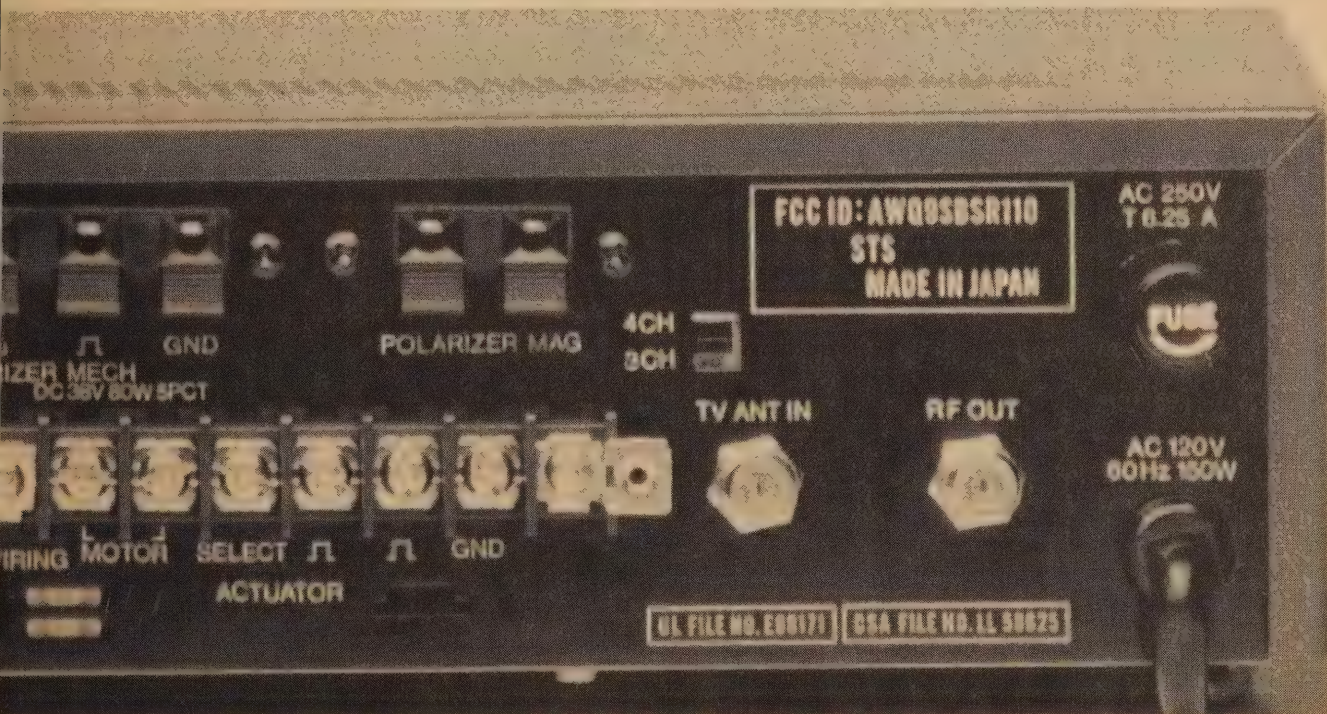
Quartz lock tuning is the next wave. Quartz means that the receiver has everything already set up so that you don't really have to do much to program it or tune it. It is more expensive.

Other considerations are how easy it is to add a microwave filter. Can you use a remote sensor on it; how easy is it to hook up to a VCR or to a monitor; does it have the raw audio and video ports to do so; what is the warranty on it; and how well do you like the looks of it?

Should you purchase a receiver with the actuator or mover built in? There is the argument that when both are in the same cabinet there is a great deal of heat buildup. That is true to some extent. Then there is the concern if one part goes down then you have to send in the whole unit. It does have its pros and cons.

I hope I have not left out anything of great importance or that by throwing all this stuff at you has not made it more confusing. There are plenty of things to consider when buying a receiver and you can get most anything you want on one, but you will have to pay for it. If all you care about is that you get a good picture and that the receiver is not too hard to use, then there is one for you at a reasonable price. It's a fact that you make a better purchase the better informed you are about what you are trying to buy. ▀

Not So Simple! - The many components of modern receivers means that wise buyers need to take the time to learn about the product.



Do You Need To UPGRADE?



BY SCOTT MEHNO

Recent statistics show that replacement sales now figure in about half the TVRO market. And in an industry that has received its share of hard knocks lately, these new figures are a much needed boost. What they reveal is that those of you who have purchased a satellite dish in the last few years may now be ready to start replacing some of your old gear with the newer, more sophisticated product in the marketplace.

TVRO, which has made more technological gains than almost any other consumer oriented industry, is still changing, even as we speak. Renewing your system takes a lot of planning and with the sudden shock effects that have hit the satellite industry recently (such as scrambling), the shopper who is ready to take another dip into the TVRO pool must look at '87 hardware as a whole new ballgame. The following are a few guidelines to use when preparing to make a second or third TVRO plunge, exploring the most

necessary items of your system that may need to be upgraded.

1. TRADE-IN Trade-in opportunities abound for the dish owner who has taken care of his system and sought out reputable products when buying their first hardware. Many retailers now offer credit for the original purchase for trade-ins. For example: A customer who bought a \$500.00 receiver two years ago may now want to upgrade. Many dealers will offer up to 100% credit (in this case \$500.00)

Is It Time To Move Into The Next Generation of TVRO Equipment?



toward the purchase of a new receiver.

Other retailers offer discounts on newer products. The first rule when trading in a piece of equipment is to make sure the company that makes the product still exists. No satellite retailer in his right mind is going to accept a trade-in on hardware that is no longer in the marketplace. You haven't spotted any Edsels down on the local used car lots have you? Receivers are your best bet with the trade-in market, and reputable lines like Drake, Uniden and Channel

Master all bring in a decent exchange rate. Items that have virtually no trade in value are your antennae, with the fiberglass lines being virtually obsolete on the renewal block. Make sure you look for other ways to get a return on those items that are already used and for sale at your local dealer. Upgrading doesn't always mean you have to trade-in equipment for brand-new hardware. Many retailers will cut the price of their total systems with a traded in receiver and new antennae, selling it as one total package. Several hundred dollars can be cut on a bundled deal like this, plus quality virtually guaranteed with the already proven equipment.

Stay away from your "under a thousand dollar" trade-in packages. Lemons often come in bows wrapped as loosely as this. Look for a solid one-two punch like a proven (though slightly used) receiver and a new established dish for your best total trade-in buy.

2. THE RECEIVER The receiver has easily become the most coveted unit in any home satellite system. It is also the number one renewal item with the satellite customer. The advent of wireless remote control, and the improvements in stereo sound in TVRO have made customers who purchased their receivers barely a year ago clamoring to upgrade to this year's model. Nearly two dozen transponders now facilitate stereo-television including MTV, Turner Broadcasting, USA Network, The Nashville Network and others. One possible path to stereophonic viewing other than purchasing new receivers outright is to alter the mono-system you already own. This can be accomplished with the purchasing of a stereo processor. A quality unit runs in the \$300 range.

A processor takes the audio signal and splits it into a dual signal, creating full stereo sound. In satellite TV a processor must be able to decode four transmission systems at once (as opposed to one transmission for broadcast TV or video). The best processors utilize one subcarrier for the right channel and one for the left, thereby tuning two subcarriers at once, called discrete stereo. Look for noise reduction circuitry and filtering as other features on such models. The processor can be connected to your existing stereo hi-fi receiver (audio) for hi-quality stereophonic sound.

An easier but perhaps more costly way to renew your receiver equipment

is to purchase one of the high-end items that are now flooding the market. The advent of block down conversion, KU band compatability, on-screen read-out, ad wireless remote units has made satellite receivers a videophile's dream. Consumer electronic giant, Panasonic, has now entered the fray. Their Panasonic 600 system is a good example of a current unit offering all of the above features for around a \$500 price tag. Panasonic and Janeil are also readying to unveil the industry's first monitor receiver unit sometime before the end of the year.

Another element to look for when receiver shopping is block down conversion compatability that is now being made available. BDC now makes it possible for all 12 channels on one polarity to be transmitted to one receiver. This enables you to have 2 or 3 sets in the home with each set tuned to a different station. Blockdown units operate at the 450 to 950mHz range or higher (standard systems oerate at 70mHz). Prices for such units can fluctuate from a low-end \$300 range to a high-end range of \$700 and up.

3. DISHES The dish is probably the most basic item of any satellite system. Exposed to wind and weather, it's often easiest to detect when this unit ought to be replaced. As I stated earlier, the fiberglass dish is fast becoming obsolete in TVRO. Bulky and cumbersome, they often wear on a mount more than anything else. When choosing another dish however, your mount is often one part of the unit that may not have to be traded in. Check the mount and other parts for any rusting that might occur. Make sure no corrosion has set in. When choosing a new dish, most experts agree that mesh is the way to go. The mesh design has overtaken the industry in the past year. Current estimates reveal that mesh and perforated dishes control about 70% of the market share.

The biggest advantage of the mesh dish is aesthetics. The see-through dish blends in with the surroundings, which is especially important in areas where zoning is a consideration. This is not to say, however, that customers looking to stick with the solid dish won't have choices. Design improvements have been made in fiberglass as well, mainly in size. Several manufacturers now boast of solid dishes 6' or smaller that equal the performance

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RECEIVERS WITH BUILT-IN DESCRAMBLERS

*They Will Be The Hottest Products
In The 1987 Marketplace*

BY BOB WOLENIK

First there was scrambling. Then came descrambler units to clear the picture. Now there are satellite receivers with built in descramblers. When you want to watch, you just turn on the set—it automatically unscrambles and produces a bright, sharp picture.

The first of these descrambler receivers are already on the market. Houston Tracker is marketing its Tracker VIII through Echospher while M/A-COM is selling its 2000 series through dealers. Both descramble the picture. In addition Drake will offer an ESR 2400 satellite descrambler receiver in the first quarter of 1987 as will Chaparral Communications.

Integrating descramblers with receivers appears to be the wave of the future. The significance of this event is the entire field cannot be underestimated, nor can the importance to the buyer and user of home satellite equipment.

Integrated descrambler receivers may be as important to the home satellite field as cheap gas is to the auto industry or video rentals are to the VCR field. To see why it's first necessary to understand where this field is, how it got here and where it's going.

They said it couldn't be done, literally. Back in the late 1970s it was a well known fact that it was impossible to build a satellite receiver system that would be economically feasible to have in the home. Commercial systems often began at \$40,000 in price. No home owner would pay that.

Then in separate parts of the country Bob Cooper and Taylor Howard built inexpensive systems from spare parts. Howard (founder and now director of Chaparral Communications) even produced a small book on how to build such a system yourself. Needless to say it was an overnight success.

Once the myth of impossibility had been broken, hundreds of electronic tinkerers began building satellite receiving dishes and receivers and low noise amplifiers and related equipment. Within a few years there are literally thousands of devices on the market, some of it such poor quality, little of it compatible with anything else.

As late as 1983 the field was still just a backyard hobby. But then, when satellite viewing was legitimized by Congress, things took off. Manufacturers poured products into the field. For the first time it was possible to buy units "out of the box", connect them up with other units, often from other manufacturers, and have them work. Standardization was rapidly occurring and along with it came buyer confidence. Things were roaring hot through 1985, until HBO began its scrambled signals in 1986. Then the bottom seemed to fall out of the field. Sales slowed and when Showtime and several other programmers also scrambled, sales almost stopped.

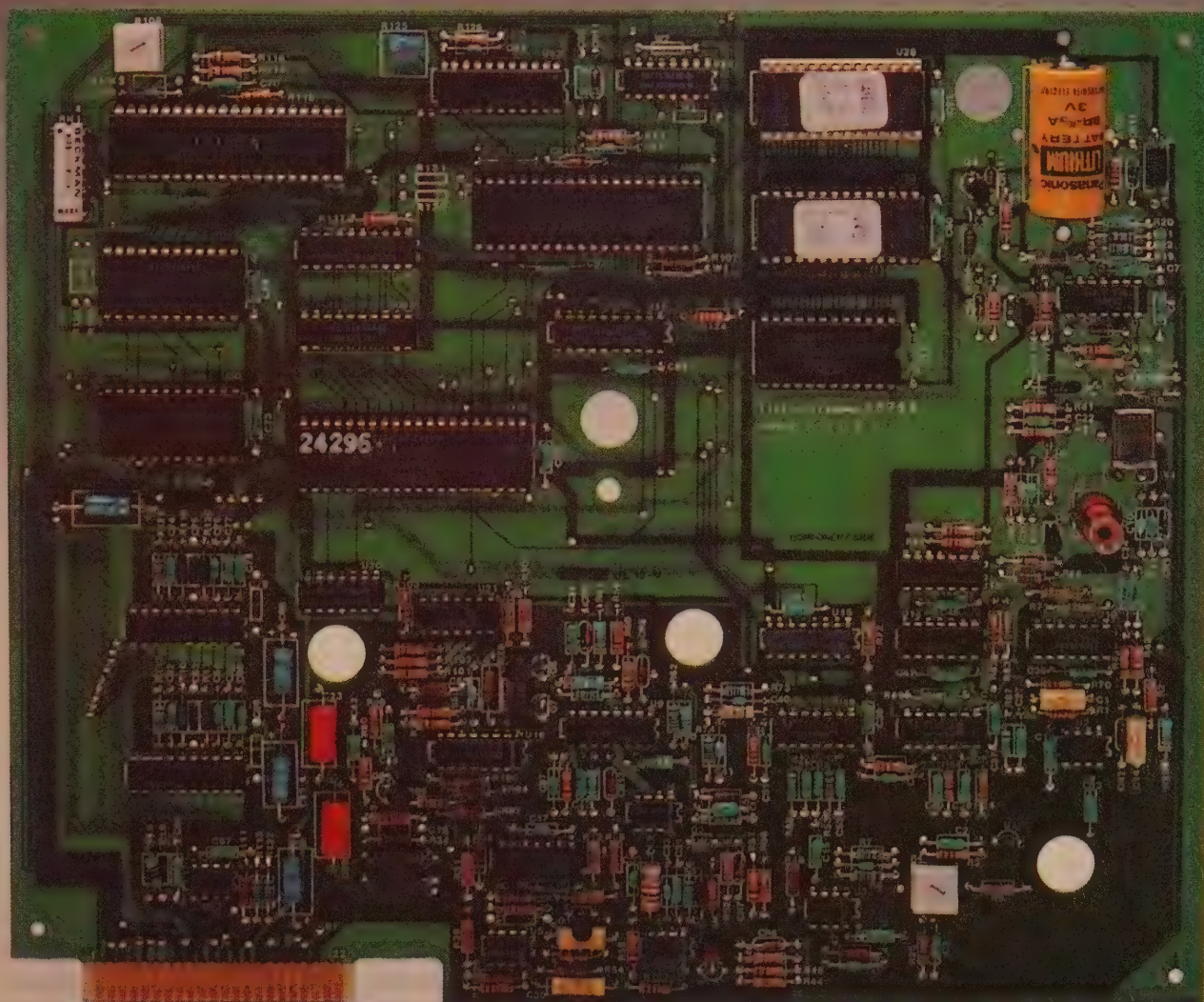
One astute individual I know compared it to the oil embargo of 1974-75. During that time the automakers in Detroit almost went out of business. They had big gas guzzling cars for sale in the dealers' showrooms...and no one would buy them. The gas crunch scared people away from big cars.

Of course, most of us can remember that time. But, do we really remember why people didn't buy those big cars?

The reason most often given is that we all just didn't want to pay the high price for gas. However, one satellite

Continued on page 36

Inside the Descrambler/receiver - The new circuitry of the M/A-COM 2500R VideoCipher II satellite receiver incorporates two technologies. The unit is not only a complete receiver, but is also a fully integrated descrambler. The result is automatically descrambled channels (for those who subscribe). In addition, descrambler features, such as parental lockout of "R" or "X" rated movies, are also incorporated. Houston Tracker, Chaparral and Drake are also manufacturing similar fully integrated receivers.



Built-In Descramblers

TV writer, Phillip Patterson, points out that that is not the true reason. He suggests that people in general were not afraid of having to pay higher prices for gas. They were willing to pay it for the added comfort of a big car. Rather, what they were really afraid of is not being able to get any gas at all!

This really came home to me back then when a very wealthy individual I knew who drove only Cadillacs suddenly appeared one day with a tiny Toyota. "Why the big switch?" I asked. He replied, "When they ration gas, I'll still be able to get around in this."

Patterson suggests that this is the same sort of reasoning that resulted when scrambling of satellite signals occurred. It wasn't that many existing viewers and future buyers were afraid of paying a bit more to get the programming they wanted. They were afraid that the desired programming simply would not be available.

Thus, it wasn't until the introduction of the VideoCipher II by M/A-COM which descrambles the picture, that sales began to pick up again.

Note, this is not to say that the VideoCipher itself sold well. While actual figures are not available, reliable estimates indicate that fewer than 50,000 of the units have been sold. This includes not only sales to buyers of new systems, but also sales to the estimated 1½ to 2 million existing owners!

What the introduction of the VideoCipher II did was to suggest to the marketplace that while scrambling was indeed a reality, so too was descrambling. If you were willing to pay the price you could still see any picture.

Of course, descrambling was crude from a consumers' viewpoint. Like the awkward box that cable users must connect on top of their TV to see programming, the VideoCipher was likewise a separate box that had to be plugged into the satellite reception system.

In addition the VideoCipher box front panel is crammed with controls for getting it operational. It looks like an add on product, something of an afterthought, not entirely "official".

What was really needed to convince consumers, to convince you and I, that scrambling was not the evil demon

that it had been projected to be, was a "user friendly" unit. What was needed was some sort of box that no longer shouted that it was descrambling the picture, but instead did so in a way that was invisible.

The answer, of course, is an integrated receiver/descrambler. This kind of unit implies that descrambling is simply a matter of taste. It suggests that there is nothing technically arcane about it. If you want to descramble, then just subscribe to the particular package you want (see the article on packaged programming in this issue) and you'll be able to tune it in.

And that's why integrated receivers/descramblers are so revolutionary and so vital.

At the present time, of course, very few such integrated units are available. Only four manufacturers have formally announced such products and of these four, only two currently have sets available on the market.

In addition, the current integrated receiver/descramblers tend to be in the high end of the field. Their prices are close to \$2,000 a unit.

This is unfortunate, especially with regard to getting newcomers in. Someone just buying their first satellite system is less likely to make the purchase when there are thousands of dollars involved than when there are hundreds.

This very likely will change, however. A VideoCipher II currently sells anywhere from \$330 to about \$400 depending on whether it's bought separately or as part of a system. Since the VideoCipher II is itself part receiver (in order to make it compatible with most off-the-shelf brand receivers), a descrambler built right into a receiver should cost much less. Estimates that I've heard suggest that the descrambler can be built into a receiver for as little as \$150 to \$250.

In any event with the introduction of the several new receiver/descramblers the ice has been broken. Very likely having a built-in descrambler will become the rule. And once it does, home satellite systems will no longer have an image similar to that of big gas guzzling cars. (By the way, once gas became plentiful again, you'll recall there once more was a huge demand for those big comfortable cars.)

HOUSTON TRACKER VIII

This receiver/descrambler has a modular design and incorporates all the essential features normally wanted in a receiver system. Besides the receiver it has the VideoCipher II unit, a positioner and a UHF wireless remote. This means that the viewer can simply select whatever channel on whatever satellite is desired from the remote and tune it in. Assuming the viewer is a subscriber, scrambled programming can be clearly tuned and seen.

One of the special features of this unit is the fact that the wireless remote is Ultra High Frequency. Most remotes are infrared. With infrared the viewer must aim the unit at the receiver usually from a distance of no more than 20 feet.

With a UHF remote, it's simply a matter of clicking the appropriate buttons regardless of where the unit is pointing. The remote will operate as far away as 200 feet from the receiver. This means that you can change channels in the living room while you're in the bedroom!

The set also features both C-band and Ku band with easy switching whether for a single or a dual antenna installation. It can be programmed for up to 100 satellite/channels and up to 100 audio subcarrier selections. In addition it offers full stereo including VideoCipher II digital stereo with extended frequency response.

For those who wish to restrict the viewing for the

Drake ESR 2400 -

Fully integrated descrambler/receiver available in 1987.





Houston Tracker SRD 8000 - Now available with descrambler and positioner integrated into single UHF remote controlled unit.

children, the Tracker VIII also features a parental lockout. Its controls are easily accessed and it has a large easy-to-read 16-character fluorescent display.

M/A-COM VIDEOCIPHER II 2500R RECEIVER

This is also an integrated unit. In one box is the VideoCipher II descrambler, the receiver and the antenna positioner (an optional power supply is needed for the positioner).

The receiver is designed to actually enhance the picture and the manufacturer claims that it will provide up to 2 dB threshold improvement over most satellite receivers. It reduces the sparklies and produces a crisper image.

The 2500R also lets the viewer supervise the programming that children watch by two methods. A password control can block out certain channels or a program can be imposed. (For example, the viewer would only be allowed to see PG or higher rated movies.)

The 2500R offers a built-in terrestrial interference (TI) filter optimized for use with the VideoCipher descrambler. The filter rejects local TI and is easily operated by the remote control or the front panel keys.

Of course there is an infrared remote. All antenna positioning and VideoCipher descrambler features are accessible with this wireless unit. You can change channels, volume, audio subcarrier tuning and system fine-tuning.

The receiver/descrambler is both C-band and Ku band ready. It comes programmed for 24 C-band channels and 32 Ku-Band channels and offers digital tuning for drift-free operation.

A plus on the unit is digital stereo sound on the VideoCipher channels, as offered by programmers. This can then be played through a home stereo system. Monoaural, discrete and matrix stereo are also available.

CHAPARRAL VIDEOCIPHER SIERRA

Chaparral is adding a VideoCipher to its well known Sierra line of receivers. It should be available about the time (or shortly after) you read this.

The new VideoCipher Sierra will be a full function, fully integrated unit (including antenna actuator). It will still

offer the many features that have made this Sierra popular including onscreen display, optimum peaking of both dish and polarity, both C-Band and Ku as well as the ability to program desired channel and dish locations.

The VideoCipher can be controlled from the red remote that comes with this unit. It will offer many of the separate functions of the VideoCipher unit itself.

Of course the Sierra also offers full stereo as well as an easy to read display.

DRAKE ESR2400

Scheduled for introduction early in 1987, this unit will feature remote control with VideoCipher functions, on-screen display showing channels, satellite, and audio.

In addition the unit offers a built-in actuator controller with a 30 satellite memory capacity. It offers both C-Band and Ku compatibility with a 50 channel capacity.

The ESR2400 also has a "priority view" of 20 channels with audio, polarity and band. It features a parental lock-out and full stereo. ↗

Chaparral Sierra II -

New units will feature built-in descrambler.



NEW FOR



Programmer - allows receiver to be used with VCR from Chaparral.

SATELLITE/VCR PROGRAMMER

Most of the people who own satellite receivers probably own VCRs as well. It's only natural to want to tape some of the great shows available from satellite TV.

In the past, however, there was a big limitation. You could only tape those shows that you were actually there to turn on and off. You couldn't, for example, set up the VCR and the satellite receiver to turn on and start taping a show at three in the morning, two nights from now.

Of course, there were possible ways around this. Most VCRs can indeed be programmed to turn on and off at specific times and they can be hooked directly into satellite receivers. But the receivers normally can't be programmed to turn on to a specific satellite and channel at a present time. Thus, the only way to make a remote recording work was to tune in the channel and bird on the receiver and then *leave it running* until the VCR turned itself

on two days in the future and recorded the appropriate show. Not a particularly efficient way of running things.

A new product by Chaparral, however, changes all that. It's called a "Sierra/VCR Programmer" and is designed to operate with any of Chaparral's Sierra receivers.

It is a 14-day, 8-event timer that interconnects with the satellite receiver. It causes the receiver to move the dish and select channels in accordance with preprogrammed choices.

We've tried one out at the *Home Satellite TV* office and find that it's simple to operate and that it performs admirably. In addition, it has some real pluses. It includes infrared senders so that it need not be connected directly to the Sierra receiver. Rather it can be located up to 20 feet away. Additionally, its slimline design allows it to fit conveniently with other high-tech equipment.

Before rushing out to buy one, however, it's important to understand

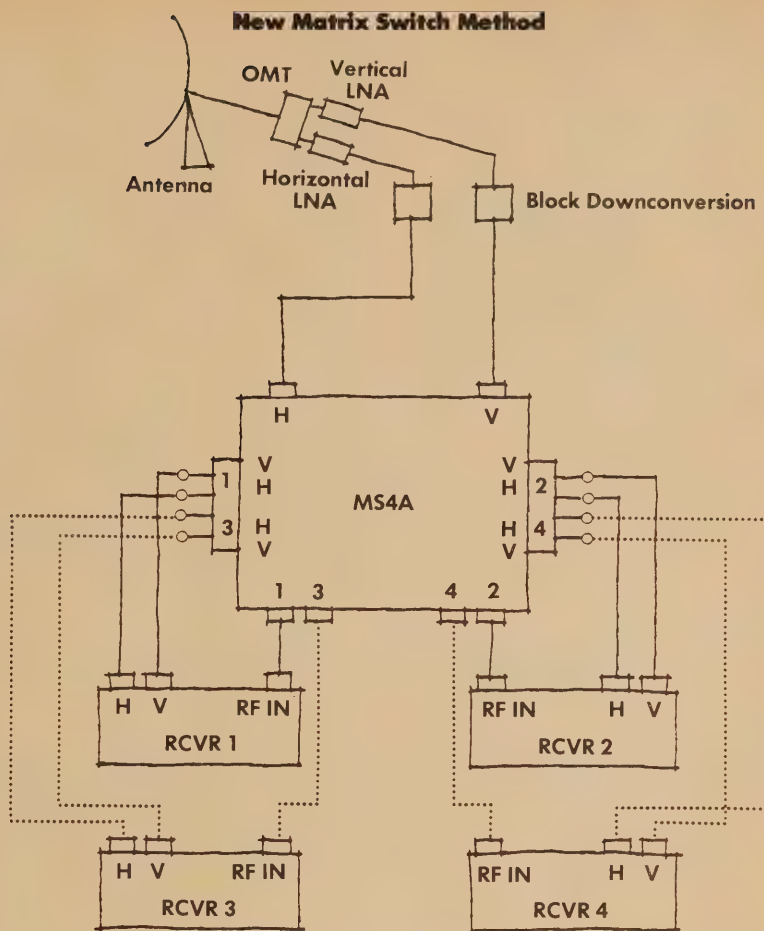
what it does and does not do. It does turn on your Sierra receiver and move it to preprogrammed channels and birds. (It is made specifically for the Sierra, not another brand). It does not turn on your VCR. This means that you must do two separate sets of programming. The VCR must be programmed to turn on and off at the appropriate times and be correctly hooked up to the receiver. The Sierra/VCR programmer must be programmed to turn on the receiver and select the channel as well as move the dish to the appropriate bird.

Maybe some day in the future we'll have a combination unit that is satellite receiver and VCR built together. But until that happens, this product blends the two in a quite useful and adequate match.

From CHAPARRAL
COMMUNICATIONS
2360 Bering Dr.
San Jose, CA 95131

'87

Some Special Products That Make Satellite Viewing Easier



Matrix Switch Multiple System

TV AND SATELLITE RECEIVER

Blending of products is already beginning to take place. Anderson Scientific this year came out with the "DACOTAH." It's a color TV with a built in satellite receiver. Although the first units were primarily C-band with few bells and whistles, it certainly seems a step in the right direction.

The DACOTAH offers a wide array of useful features including block downconversion technology, on-screen electronic tuning, audio tuning for satellite radio, and polarotor I Control. The unit is descrambler compatible and powers in-line LNAs.

The DACOTAH was originally brought out by Anderson Scientific for the European market where size is a significant concern to many buyers who must often adapt satellite TV equipment to small apartments or homes.

The success abroad led the manufacturer to introduce the unit to the American market as "an extra set for the den, patio, kitchen/laundry or kid's

Continued on page 40



Combination receiver/TV - from Anderson Scientific.

New For '87

room." The unit will work in a block and/or dual feed system.

The DACOTAH offers a 13 inch full color screen with both VHF/UHF conventional tuning. It is able to switch between satellite TV and cable or antenna with a simple turning of a switch. The picture on the screen is as good a quality as any 13 inch color TV we've seen. And because of the small size, the set is truly portable allowing the user to move it from room to room throughout the house.

From ANDERSON SCIENTIFIC
2693 Commerce Rd.
Rapid City, South Dakota 57702

MULTI-SET SWITCH

Anyone who has owned a satellite system for any length of time knows that one big problem is the disagreement between family members over what to watch at any given time.

The answer to this has been block down conversion which allows a dual polarity system to expand to include many receivers (so several TVs can be running different channels simultaneously).

The problem is hooking the whole thing up. With multiple receivers and TVs come multiple wiring nightmares. However, there is a simple answer—a matrix switch.

Pico Products has just introduced a

matrix switch that allows the hookup of up to 4 separate block down receivers.

One matrix can place satellite receivers in as many as four rooms in a household to give each family member independent access to any transponder available from a satellite (a separate decoder is required for each receiver in order to view scrambled premium programming). Matrix switch multiple systems are easier to install and service, and easier to understand and operate.

A matrix switch combines all the components and accessories required for multiple receiver applications within an attractive compact unit. Each unit contains two 4-way power dividers, two high frequency line amplifiers, two D.C. power inserters, and four pin diode A/B switches. These components are internally pre-wired for instant use.

Before the matrix switch was developed, there were two methods for multiple receiver installations: the master/slave system and the block down conversion system. Both systems required complicated component interconnections and are difficult to install and troubleshoot. Each multiple system installation requires the addition of another LNA or replacing a single LNA with an LNB.

Master/slave multiple systems offer only half the viewing options that matrix switch and block down conversion multiple systems provide. In this type of system, the functions programmed on the master receiver con-

trol the functions of each slave receiver. Each slave receiver can only view transponders with the same polarity as the transponder being viewed by the master receiver. If the person watching the master receiver selects another channel with a different polarity, a person watching another program on a slave receiver cannot continue watching the same program. If the master receiver's power is off, the slave receivers will not function.

Block down conversion multiple systems provide each receiver in the system with access to all transponders available from a satellite. However, interconnecting all the components and accessories necessary to make this type of system work is a cumbersome and time-consuming job for the installer. Troubleshooting this system could take hours.

Matrix switches take the headache out of installing, servicing, and operating a multiple receiver system.

There are four manufacturers of matrix switches: Pico Products, M/A-Com, GFA Technologies, and Uniden. While these switches operate in the same manner, some will only work with that particular manufacturer's receiver.

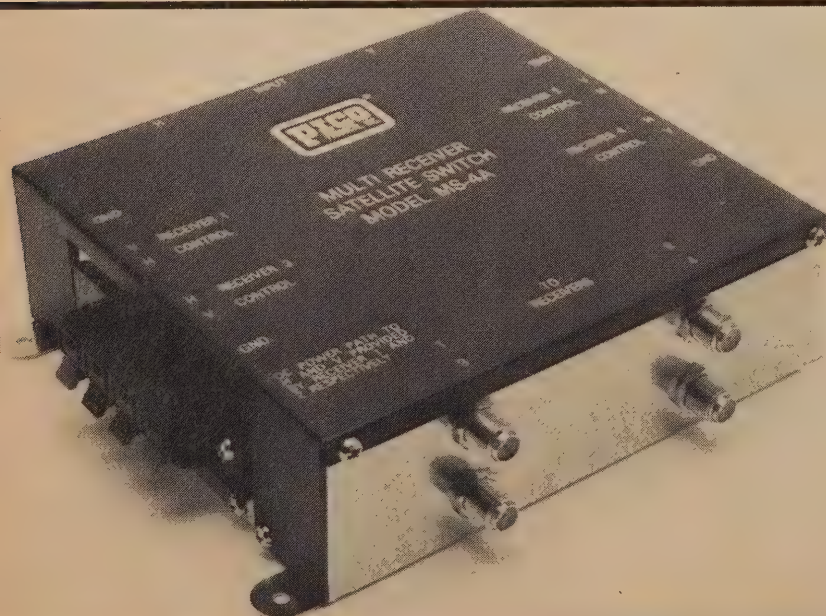
Pico has three matrix switch configurations; The MS-4A, MS-4B, MS-4P. These multi receiver satellite switches can interface with a number of name brand satellite receivers.

The MS-4A operates with any receiver which has a positive to ground switching system. This includes such receivers as Pico's HR-1000 stereo remote control receiver and HR-100 C/Ku-Band receiver, Drake, General Instrument, and Amplica. The MS-4B can be used on receivers with a positive/negative to a ground switching system, including M/A-Com's T1 and H1, DX, Chaparral, Uniden, Kenwood, STS, Arunta, Electrohome and Panasonic. The MS-4P easily interfaces with receivers which output a continuous pulse to a servo polarization device, otherwise known as a polarization rotator three-wire interface. Your satellite dealer can help select the correct matrix switch configuration to match your satellite receiver.

A matrix switch multiple receiver system makes satellite television a family affair and gives each family member the programming of their choice.

From PICO PRODUCTS
103 Commerce Blvd.
Liverpool, N.Y. 13088

Matrix Switch - Allows use of up to four TVs by Pico.



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YOUR INTEREST IN TVRO (pronounced 'TIV-ROW' by insiders!) is evidenced by your reading this publication. If you feel your life will not be totally fulfilled until you have uncovered all of the 'trade secrets' of this fascinating flight into the future, stand by for a revelation of the 'true inside grit' from the master of TIV-ROW; **Bob Cooper, Jr.**



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It's About Time Someone Clear



As this actual screen to screen comparison shows, Starcast's™ exclusive PicturePlus™

 There are some things that just don't belong on television today.

"Sparklies," for example.

You know, those disgusting little electronic glitches that are forever turning otherwise decent television programs into something unwatchable.

Well we're not going to take it anymore.

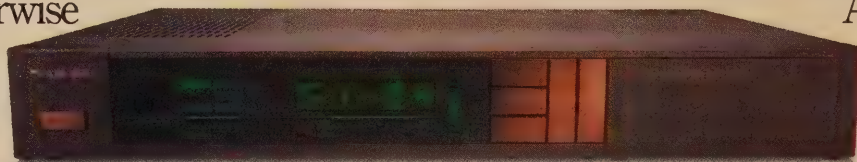
Introducing the Starcast System™ and its exclusive PicturePlus™ circuitry.

Just push the PicturePlus button and "sparklies" virtually disappear.

Giving you the clearest picture in satellite television.

The Starcast receiver also comes with a built in antenna positioner, full-function remote control, parental lock, digitally synthesized audio, and more.

And there's even a feature called "Snapshot Memory"



The Starcast receiver has it all, including built in antenna positioner, "Snapshot Memory," remote control, stereo, true C/K Band compatibility and more. And it's ready to accept any of the major descrambling units now available.

that remembers satellite location, video fine tuning and audio mode.

As you'd expect, the Starcast receiver is truly C/K band compatible and ready to accept any descrambler on the market.

Of course, there's no way we'd let

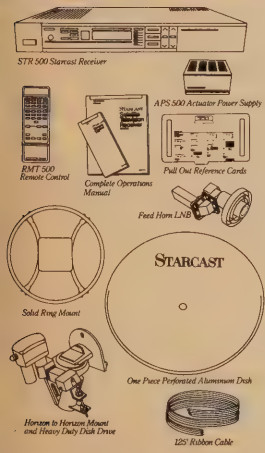
ned Up The Filth On Television.



Our circuitry can turn a dirty picture into one the whole family can watch.

a receiver this good be matched with anything less than a perfectly matched system. So to make sure you get perfect pictures all the time, Starcast is sold as a complete system. With every-

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Microwave Communications, (800) 245-3435.



Just give us a call toll-free 800-245-3435



The Starcast 8 ft. one piece aluminum dish is formed on a precision steel mandrel.

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The Clear Choice In Satellite Television.

THE PRICE GOES DOWN

*New Packages of Scrambled Services
Are On The Market—
And They're Good For Satellite
TV Owners*



BY PHILLIP PATTERSON

The cloudy future of scrambled programming is clearing up rapidly in the final quarter of 1986 thanks to a number of companies attempting to package scrambled programming and make it available to dish owners at attractive and easy-to-pay rates.

While much of the news concerning scrambling has been the succession of announcements as first one service and then another followed HBO's lead and scrambled its signal, a number of companies—including some of the very programmers who have scrambled their signals—have been working behind-the-scenes to create a package deal that will offer the consumer the convenience of "one-stop shopping" for scrambled services and a savings over each scrambled service's asking price. While most of the packagers are still in the planning stages—awaiting additional scrambled programming and subsequent consumer demand—the number of corporations interested in the direct broadcast sales market virtually assures the backyard dish owner of a good deal when the programs are announced later this year or early next year.

As of this writing, HBO, Showtime, Turner Broadcasting System and at least two independent companies are getting ready to deal directly with the home television receive-only (TVRO) market in selling packages of scrambled programming at reduced prices with the convenience of a single bill for all services ordered. The only hold-up appears to be a present lack of scrambled programming. "You can't sell something to somebody until they have to buy it," says Showtime's Steve Schulte of the current delays. Schulte and others agree that as more of the "basic" cable channels follow the lead of the premium channels and scramble their signals, the new packages will increase in popularity. Basic stations which have already scrambled include CNN and Headline News, both from Turner Broadcasting. Others have announced start-up dates for scrambling and/or signed on with one or more of the packages including the Christian Broadcasting Network, MTV, VH-1, Nickelodeon, ESPN and the United Video superstations WGN, WPIX and KTVT.

Many of these programmers will complete their scrambling plans by the end of the year, and could perhaps even be scrambled by the time you read this article. As they are scram-

bled, the first step for the dish owner to take will be the purchase of a descrambler. Although there are several on the market, the packagers we talked to were all planning on using the MA-Com VideoCipher II, the industry's first descrambler and the one used by the programmers who have scrambled their signal to date.

Following the purchase of the descrambler, there are several ways to find out about the packages of programs that are available. Virtually all of the services have a toll-free number available for consumers to call for rates and available programming. Many are being offered through dealers of satellite television equipment. United Video and Turner Broadcasting, both have a brochure inside the VideoCipher box, describing the package they offer. Showtime is offering information about its package on the air from 9:30 to 6:30 EST on Satcom 3R, transponder 12.

While there are about a half-dozen prospective packagers waiting for scrambling and the resultant consumer demand to increase demand for their services, the consumer will really notice only two varieties: those packages which are "driven" by a premium channel with basic channels added in, and those packages which feature basic services only. The reason for this is simple. While a basic channel, like CNN for instance, is willing to share its signal with many packagers, the premium channels, like HBO/Cinemax and Showtime/The Movie Channel, are using their programming to launch their packaging efforts and are not currently willing to share it with packagers whom they view as competitors. The result to the consumer is that no one packager is going to offer a number of premium channels and the dish owner who wants HBO and Showtime both would have to buy one programmer's package and purchase the other "a la carte" in order to avoid paying for a number of channels twice when buying both packages.

However, even this minor confusion is not a problem for most dish owners who merely want their basic cable channels unscrambled and possibly wish to subscribe to a single movie channel. And, when one thinks back to the uncertainty of just twelve months ago, the current packages, even in their embryonic stage, look like some very long-awaited good news for home dish owners. As the

need for the packagers increases, more potential packagers should develop, leaving the consumer in a strong buying position. "The marketplace will decide the value of the product," Schulte said.

The prospect of convenient and affordable access to scrambled programming should be a boost in the arm to not only the individual dish owner, but to the industry as well. For the past 18 months, industry leaders have attempted to work with programmers to settle the issue of compensation for programming by the home dish owner who had been getting the programs "free". Much of the resulting negotiations were done via the media, with the general public getting the impression that the skies would soon be "dark" to dish owners,

The prospect of convenient and affordable access to scrambled programming should be a boost in the arm to not only the individual dish owner, but to the industry as well.

causing a dramatic downturn in sales. However, the home TVRO market is now looked upon as a valuable market by the programmers and the move to package scrambled programming is a result in that change of attitude according to Showtime's Schulte. "The right attitude will turn this industry around. No one should be greedy here. We want people to accept the idea of paying for and getting value. In turn the programmers welcome the backyard market as an important consumer group."

We will now look at some of the companies that are attempting to package programming for the TVRO viewer. At press time, most were awaiting contracts to return before they could announce services and prices. However, the intentions and philosophies of the companies are interesting to the dishowner who can then follow up with the toll-free numbers for the latest information. The programming and costs, when given, should be

taken as only an estimate of what each service intends to do.

Showtime/The Movie Channel was among the first programmers to actively pursue the home dish market. At a period in time when many dish owners were hearing that "the skies would go dark," Showtime was sending its executives to satellite television trade shows to promote harmony between the industries. According to Steve Schultie, senior vice president for direct broadcasting development, Showtime hopes to offer a "ten channels for ten dollars" package in the near future.

"We're hoping to offer ten programs for around \$10 in addition to the cost of Showtime or the Movie Channel. Realistically, I think that this means that a consumer could have all the scrambled basic channels and their choice of a premium channel for under \$25 a month," Schultie said. Tola Murphy, director of public relations for Showtime says that the company is currently dealing with CNN, Headline News, ESPN, MTV, VH-1 and Nickelodeon to be a part of their basic package at \$10 a month. In addition, Schultie says that they are pursuing other basic and premium channels to enlarge the package.

Currently, Showtime and the Movie Channel can be purchased as a package at \$16.95 a month, compared to their individual price of \$10.95 each. A dish owner wishing to pay by the year can pay \$120 for one service or \$186 for both, Schultie said, a savings of more than 8 percent over the monthly price. To order the package, consumers must purchase a VideoCipher decoder and call Showtime at 1-800-422-9000.

Home Box Office is also in the process of building a package of programming around its popular movie channels, HBO and Cinemax. The package will feature the basic channels as soon as they scramble, said HBO vice-president Bob Caird, and could include other premium services such as the Disney Channel and the Playboy Channel if contracts can be negotiated. "We've exchanged contracts in some cases," Caird said but no commitments had been finalized at press time. HBO currently offers a package deal to dish owners consisting of their two channels, which Caird calls "reasonable and quite close to what you might pay on cable." Currently either HBO or Cinemax costs \$12.95 or \$19.95 as a pair. Paying on a yearly

The Price

basis gives a further 16.5% discount, Caird said. The HBO channels also require the purchase of a VideoCipher decoder. The service is activated by calling 1-800-HBO-DISH.

The first of the basic services to scramble were Cable News Network and Headline News, both owned by Turner Broadcasting System of Atlanta. Now Turner hopes to use these services to launch a package of scrambled services which CNN's Marty Lafferty says is "like the concept of a magazine clearing house except with channels."

The current plan of the CNN/Headline News package is to gather a number of scrambled basic services such as ESPN, CBN and the superstations and allow the consumer to be the packager. "The consumer will be the packager, we will be the facilitator," said Lafferty. "We'll offer the programming à la carte or as a package. The more the consumer buys, the deeper the discounts."

So far, Turner Broadcasting seems to have its marketing programming more developed than the other would-be packagers. Already, the CNN/Headline News is available for \$25 a year. Satellite television dealers across the nation are authorized sales outlets of the two-channel package and their brochure is a part of the VideoCipher carton assembled in Puerto Rico. In addition, consumers purchasing certain models of satellite television equipment have been getting a year of the service for free.

Turner has one more innovation planned, according to Lafferty. After the number of programs in the package increases to where it is unwieldy to describe them all on the phone, Turner Broadcasting hopes to offer its package to a consumer free for one month. At the end of that month, the consumer will respond to a brochure mailed by Turner and create their own package of descrambled programming. Lafferty says that employees of the company are currently working on the name for the service and that the toll-free number is available through dealers and the VideoCipher boxes.

The company is not publicizing the number in hopes of keeping its costs low. In the future, Lafferty said, the Turner package could include premium stations, such as Disney and Playboy, but for the present he sees it as a package of basic channels as soon as

they scramble. "Ours is a basic-driven package, and we will probably offer the best deal in the basics," Lafferty said.

Bob Vogelsang, president of the National Satellite Programming Network, located near Houston, entered the TVRO packaging market with much experience in programming negotiation. He had previously been responsible for getting ONTV and SelecTV to service the private cable industry through a 405 member organization known as the National Satellite Programming Coop. The coop eventually brought 40 programming services to the private cable operators for such facilities as hotels,

Turner Broadcasting hopes to offer its package to a consumer free for one month. At the end of that month, the consumer will respond to a brochure mailed by Turner and create their own package of descrambled programming.

apartments and hospitals. Vogelsang, however, says that he has found "backyard rights" even harder to obtain than the right to service the private cable industry (which, incidentally involved an antitrust suit won by Vogelsang against several programmers).

"Every programmer will put together a package with the premiums being the only ones with the premium channels. They're not going to share their channels with anyone else," Vogelsang said. He has already contacted most of the premium channels to be a part of his package and has been denied.

The package which NSPN hopes to offer by December will include CNN, Headline News and three superstations. Vogelsang and others are vying to get SelecTV as a premium station; however, Vogelsang said that the recent sale of SelecTV to Amway makes it more likely that they will also attempt to launch their own package. NSPN is still setting a price for their service and does not yet have a toll-free number. They can currently be reached at 713-342-9655.

One unique package that is being

formed will feature three network affiliate superstations and is designed primarily for dish owners in rural areas who cannot receive network programming clearly. The package, called Prime-Time 24, is owned by Satellite Broadcast Network in New York. SBN president Kazie Metzger says she expects to launch the package in November.

Using the Videocipher decoders, and broadcasting on Galaxy 3, Prime-Time 24 will feature a station from New York, Chicago and Atlanta, each representing one of the networks and each on the air 24 hours a day. The package will sell for an annual fee of \$49, Metzger said. "We see our market primarily as people in rural or mountainous areas who can't get all three networks. We hope to sell through distributors to dealers so that consumers can buy our service as they buy a dish." Prime-Time 24 can currently be reached by calling 211-725-1132. They expect to have a toll free number soon.

United Video of Tulsa is also offering an economical three-station package on an annual fee basis to its subscribers. The package, called the Superstar Connection consists of superstations WGN of Chicago, WPIX of New York and KTVT of Ft. Worth. All three stations carry a heavy schedule of major league sports programming such as the Mets, Cubs, Rangers, Bullets and Mavericks. The fee for the three stations is \$36 per year and \$75 for a three-year period. United Video's Jack Rilev says that they are looking into reciprocal agreements to offer the superstations in other packages and offer other programming in the United Video package in the future. He sees the United Video package as being a "full range of basics at a low annual price."

United is working with satellite dealers to offer their service through the local dealer. Their toll-free number should also be operational by November, Riley said. In the meantime, consumers can reach the Superstar Connection at the number on the brochure inside the VideoCipher box or by writing 3801 S. Sheridan, Tulsa, OK 74145.

More packages will undoubtedly be formed in the weeks to come. And while there are still several unknown factors in the "one-stop" approaches, the number and diversity of the packages should assure the consumer of a fair deal in getting scrambled programming for their dish. ■



Send and Receive Sound - you can do it with your dish!

MAKE YOUR DISH A Big Ear

An Antenna Can Also Be An Acoustic Collector

BY JIM VINES

Can I use my dish as an acoustic collector? What would happen if I cranked my dish down toward the horizon and used it as a listening device? Or for "throwing" my voice?

It's strange that so few people have asked these questions. Whenever I visit my buddy Wally Baydala at his acreage north of Edmonton, Alberta we crank his big (16 foot) Paraframe Communications dish down to the horizon, and listen to an incredible variety of sounds across the countryside.

One evening we aimed Wally's dish toward his neighbor's house, 1,000 feet away. Normal conversation could be heard over the rustling of the

prairie grass between us and them. The conversation stopped abruptly after Wally (speaking loudly but not shouting) said "Hello, John".

Through binoculars we could see our friends looking around, and we overheard someone say "Wally... Wally? Where are you, Wally? Sounds like he's next to us but I don't see him!"

While setting up a 16 foot dish near the shore of the Arctic Ocean a few years ago I spotted a group of Inuit camped across a pond perhaps a half mile away. Evesdropping with the dish, I could pick up bits and pieces of conversation. When I shouted HELLO they began searching in the

tall tundra grass around their tent, apparently thinking one of their group was up to some mischief.

Would a mesh dish work as an acoustic collector? It should. At approximately 250 hertz, a man's voice has a wavelength of 4.4 feet. Sounds in the 1,000 hertz range (such as leaves rustling) have a 1.1 foot wavelength. These are far longer than the 3 inch wavelength of C-band satellites, or the 1 inch wavelength of the Ku-band; *so the mesh openings should be of no consequence.*

How big a "boost" would a 10 foot dish provide? If the sound being listened to was a rather low 300 Hz, the "boost" provided by the dish would still be substantial -- about 17 dB. But the gain of the dish increases with frequency; so that each time the frequency is doubled (from 300 to 600 Hz, and from 600 to 1,200, etc.) the amplitude of the sound is also doubled... because the dish's gain has *quadrupled*. So with each doubling in sound frequency the increase in dish gain (over the human ear) is another 6 decibels.

Since human speech contains many "frictive" sounds (c's, g's, j's, q's, s's, t's, etc.) which register at higher frequencies than the typical male voice, the effect is to "fill-in" for "lost" information, as these higher frequencies are boosted more effectively by the dish. This is very important because high frequency sound waves attenuate more rapidly with distance than low frequency sounds do.

"Mic"-ing your dish will have a truly radical effect. Many years ago Edmund Science Corp. advertised an 18-inch diameter "Big ear", which one of my nephews bought. At the focal point of the small dish was a microphone which was wired to a pair of earphones, also supplied by Edmund. With this setup we could easily hear valves clattering in a car engine three blocks away!

Ditto for ordinary conversations!

So who cares whether they scramble satellite programs; you can "mic" your dish and listen to the grass growing.

Or you could mount a bullhorn on your dish and throw your voice for perhaps a mile. If you're out in the country you'd sure wake up the folks in town! ▲

NOTE: HSTV readers who experiment with their dishes as "acoustic collectors" are welcome to write to Jim Vines at P.O. Box 448, Monee, Illinois 60449-0448.

The basic parts to your TVRO system determine how well your system will (or will not) function when installed as a complete system in your yard. Here is a guide to the system parts which make-up the TVRO 'system jig-saw puzzle.'

Antenna: What you think is the antenna is not actually the antenna; it is a reflector. That large, disc-looking gadget sitting in your yard is a collector of energy. It functions much like a concave mirror, collecting the energy arriving on earth from the satellite some 24,000 miles (more or less) distant. The reflector is shaped like a parabola, which high-school geometry taught you is 'the locus of a point moving in a plane so that its distances from a fixed point (focus) and a fixed straight line are equal.' The key words here are 'focus' and 'equal.' The parabolic shape captures energy from a source (the satellite in our case) and redirects that energy to a common *focus* point. Therefore, all of the energy intercepted by the reflector is focused to a single, common point. It is at this focus point where the real antenna (called a 'feed') is installed.

Feed: As long as the surface of the reflector is parabolic in shape, the energy intercepted by the reflector surface will reflect to a point where the feed (antenna) is installed. The feed has an opening or mouth which is designed to accept all of this reflected energy, regardless of whether that energy comes to the 'focus point' from the center of the reflector (dish) or off to a side or edge (perimeter). As long as the dish is 'parabolic in shape' (ie. not 'egg-shaped') the energy is said to be 'in phase' and it will 'add up' (as numbers add up to higher and higher totals) to make the total energy arriving at the feed greater. When a dish is warped or egg-shaped, some of the energy reflected arrives at the feed 'out of phase' and rather than 'adding up' it 'subtracts down,' actually reducing the total amount of signal energy present at the feed (that's how a larger dish can sometimes work worse than a smaller dish; some of the dish energy is 'out of phase' and it *subtracts from* rather than *adds to* the total amount of energy collected at the feed.)

Polarity Selection: Most modern satellites transmit two separate groups of satellite channels at the same time, essentially on the same frequency assignments. This is possible because the satellite takes every other channel (ie. 1,3,5) and transmits that group of channels using one common polarization (such as vertical) while at the same time the remaining channel group (2,4,6 etc.) are transmitted from the satellite in the *opposite* polarization. Think of it this way: there are 24 men on the team. 12 lay down on the ground, flat (horizontal) and 12 stand up straight (vertical). The vertical row of 12 and the horizontal row of 12 can occupy what appears to be the same space at the same time because one group is on its side and one group is up and down. At your TVRO dish there is a small 'probe' or sensor pick-up mounted inside of the feed unit. This probe is connected to a motor (or switch) so that the sensor can face one direction (vertical) or the opposite direction (horizontal) on command. When you wish to watch horizontal (polarized) channels, the probe is commanded to lay down on its side. When you wish to watch vertical channels, the probe motor moves the probe so it stands straight up and down.

Different satellites have adopted, on purpose, different polarity schemes. Galaxy, Westar, Anik (etc.) have adopted one set of polarized standards (odd numbered channels are horizontal, even numbered channels are vertical) while SATCOM and Telstar (etc.) have reversed the polarization

THE BIG PICTURE

The Basics of An



(odd is vertical, even is horizontal). Thus TVRO receivers have a 'polarity format' switch to correspond to the system in use by the various different satellites.

Low Noise Amplification: The signals scooped up by the feed (probe) are exceptionally weak and must be amplified many thousands of times (up to 100,000 times) before they are strong enough to produce useful pictures and sound. The low noise (amplifier or block converter) system bolts directly to the feed system to amplify these very weak signals before they are passed through to the receiver proper. Low noise means that in the process of making the signals stronger, a minimum amount of noise is contributed to the signals. An ideal unit would amplify the signal and eliminate (cancel) all of the noise. There is no such ideal unit so some amount of noise must be accepted. LNA/LNB devices are graded based upon the amount of noise they contribute to the signal(s) with less noise being more desirable. The noise is measured on a test set which establishes the noise contribution in 'degrees Kelvin' or K. A 65 degree LNA/B is a better unit than an 85 degree unit because there is approximately 24% less noise in the 65 degree unit. LNA/B units vary in noise quality and their cost is a function of how good they are. Manufacturers would ideally produce 100% of their units as 65 degree (or lower) devices but in practice they get a small percentage of 65 degree units, a larger percentage of 75 degree units, a still larger percentage of 85 degree units and so on. Those that work best, and have the lowest noise temperature, are also in shortest supply or 'yield' and therefore cost most.

Downconversion: The super high frequency (SHF) microwave band signals which satellites use to transmit to earth are not capable of being carried for long distances inside of cable. Even very short lengths of standard coaxial cable will attenuate (reduce in strength) these SHF signals very quickly; to about 1/2 power in approximately 5 feet of common coaxial cable. To overcome this 'cable loss factor,' TVRO systems translate or convert these SHF band signals

Earth Station



to a lower frequency band (called an 'IF' or intermediate frequency) so that cable runs to several hundred feet can be used between the dish antenna and amplifier, and the receiver proper, usually located inside of a home. The unit that does this 'frequency conversion' or translation is called a *down-converter*; 'down' because the SHF band of signals is converted 'down' to a lower frequency band.

The downconverter may be in a box all to itself, mounted behind the dish in a weatherproof container, or, it may be in the same container as the LNA, mounted at the feed or the antenna (called an LNB).

Motor Drive: The antenna is designed to track through the sky, following an imaginary arc or belt in the sky some 22,300 miles above the equator; kind of an elevated 'equator ring' or 'shadow.' It is along this belt, at regular intervals of several thousand miles, that the geo-stationary (ie. Clarke Orbit, 'stationary') satellites are parked. The dish is moved from satellite to satellite, along this imaginary belt or highway, with a motorization system which is controlled from indoors (the actuator or controller).

Dish Mount: The antenna must be suspended in a stable, stationery position above the ground and installed on a rotating arm which allows the motor drive to sweep the dish left and right (east and west) along the Clarke Orbit belt. The mount is a rigid, strong support for the dish proper, plus it also serves as a mechanism that allows the dish to pivot around a central arm or point to trace an arc through the sky that approximates the location in the sky where the 'Clarke Orbit Belt' is located.

Dish Cabling: Interconnection between the outdoor antenna (feed and LNA/LNB), the motor drive, and, the indoor receiver and dish controller system is done with a set of cables. Each cable or wire size is selected by the function to be fulfilled. Signals from the downconverter to the receiver must be transported in a protected, 'shielded' environment. Coaxial cable, with a circumference of 'shielding wire' around the center signal-carrying wire is for this pur-

pose. The motor drive uses a relatively low (DC) voltage but consumes several amps of power. Thus, this wiring must be heavy duty to carry the heavy flow of current and excessively long runs will reduce the voltage available because of 'voltage drop' along the wire length. Dish sensor controls, which tell the indoor dish mover where the dish is pointed and when and where it has stopped, carry no voltage or a very low voltage and are typically small diameter cables with or without a protective 'shield' to insure that local interference does not leak into these wires and cause false 'sensor indications' at the dish controller.

Receiver/Demodulator: The downconverted signals travel indoors from the dish on coaxial cable to be processed inside of the receiver. When transmitted from the satellite, the video and audio signals are mixed together and the receiver must separate the two signal 'bits' and then after separation individually process these signals. On the back of (most) receivers there are 'video' and 'audio' output jacks which can be connected to TV 'monitors' (not receivers) for viewing and listening. Since most people do not own 'monitors,' there is also an 'RF' or 'modulated' output connector on the back of the receiver which is connected directly (or through a switch) to the standard TV receiver antenna connection post. In this case, the TV receiver accepts the satellite TV programming just as it would accept any regular TV or VCR signal because the original super high frequency (SHF) satellite broadcast has been reduced in frequency to a new frequency which is compatible with the TV set tuning system, and the satellite broadcast has also been 'converted' from the special 'FM' (frequency modulation) transmission format to a standard 'NTSC' (American standards) TV signal.

Audio Tuning: Because the audio signal(s) is mixed with the video during the satellite transmission phase, it is possible to send more than one audio signal with one TV picture and not have interference. Many satellite services carry several additional audio (or data/text) channels of information unrelated in program content to the TV picture. To tune-in these 'auxiliary' signals on a satellite channel, the TVRO receiver has a special audio tuner built in. For reception in stereo, two identical audio tuners are built into the TVRO receiver and one is used for the 'left channel' while the second is used for the 'right channel.' Connections on the rear of the satellite receiver allow the user to select mono (single channel) audio, stereo audio, a variation of stereo audio, and connect that sound to an external sound (hi-fi) system.

Remote Control: All of the functions of a satellite receiver system can be removed from the receiver proper and placed inside of a handheld 'remote control.' The remote control duplicates some or all of the receiver's operational functions thereby allowing the viewer to 'direct' the system from channel or satellite to satellite from a distance. Remote controls are either wire-connected (ie. piece of wire between the satellite receiver and the remote unit), infrared (using an infrared light beam to transmit the commands from remote to receiver) or 'UHF wireless' (using an ultra-high frequency radio signal to transmit the commands). Wire-control remotes require direct wire connections between the two units; infrared remotes must have 'line of sight' contact between the handheld unit and the TVRO receiver (sensor) unit. UHF wireless units can command the receiver and dish through walls, floors and other objects over a range of several hundred feet (typically). Some infrared units can be 'extended' to additional rooms with a combination of infrared and wire-interconnected 'substations' between rooms.



A "CHIP"

That Unlocks Scrambling

*The Hackers Have Done The Impossible,
And It Could Be Good News For Dish Owners*

BY BOB COOPER, JR.

The creators of the present defacto satellite scrambling system, a group of scientists and engineers at the Link-Abit facility of electronic supplier M/A-Com, are feeling pretty uncomfortable right now; their baby has been 'broken.' The busting of Videocipher was the second casualty in the satellite scrambling wars in less than 90 days time. The previously invincible Oak Orion scrambling system, created by Oak Industries back in 1981, fell earlier in the summer. A black plague has fallen into the scrambling camp and we need to assess where or indeed if it will end.

I remember the first public showing of Videocipher. Several people with Doctor in front of their name proudly stood on a stage and explained that their scrambling system was so invincible that it would take the most powerful computer in the world several years to break the codes used. They trotted out a number that could only be used when counting the number of stars in the universe to describe how unlikely the odds were that their DES Code would ever be dissected by pirates. Then they told us the scrambling system was based upon something called DES or the Data Encryption Standard. "This," they explained, "is the

same scrambling system in use by the U.S. military and foreign service people to encrypt highly sensitive message traffic sent worldwide."

Well, last summer the National Security Administration (NSA) made an announcement. "Effective 1 January 1988," the announcement began "the U.S. government will no longer sanction the DES code for encryption systems. The DES code has become vulnerable to code breakers." That announcement slid out without fanfare or ceremony. Weeks later, the first satellite hacker was proudly boasting that he had busted Videocipher.

The entire scenario surrounding the introduction of Videocipher has been cloaked in mystery and intrigue from the beginning. HBO went to 'industry' and asked for bids on a secure video and audio transmission system for their satellite feeds. Several firms responded and it was up to HBO engineers and company consultants to select the scrambling system which gave them the best promise of financial returns on their investment. After nearly two years of study, they selected a system proposed by M/A-Com, a then \$750,000,000 per year company up to its eyeballs in military and high tech microwave communications equipment. M/A-Com was going to use a recently acquired corporate subsidiary, LinkAbit, to create the system. The encryption system selected by HBO was called Videocipher and the system demonstrated made mincemeat of both the audio and the video components of the transmission.

After HBO awarded the contract to M/A-Com, a strange event unfolded. The system bid by M/A-Com and selected by HBO turned out to be so terribly complex that the individual descramblers intended for cable firms to use were going to cost perhaps \$10,000 or more—each. So back to the drawing boards went M/A-Com and HBO, and out came a modified version of the system. They called it Videocipher II (for second generation). The comparison between the first system and the second was roughly the equivalent

The Magic Chip - They said it couldn't be done. But Bob Cooper, publisher of *Coop's Satellite Digest*, holds up the proof. These chips will unlock the Oak-Orion descrambler. The Videocipher has been broken through the U30 device found inside of the M/A-Com descrambler and pictured on our front cover. It holds the key to a "quick decoding" fix discovered by many Videocipher hackers. The chip is re-programmed with user instructions which essentially unlock the descrambler for transmissions which were previously secure.

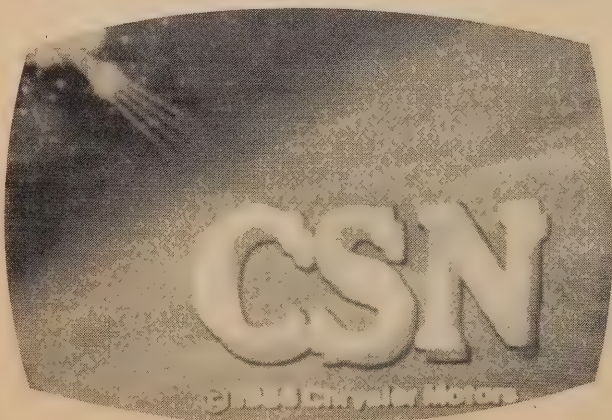
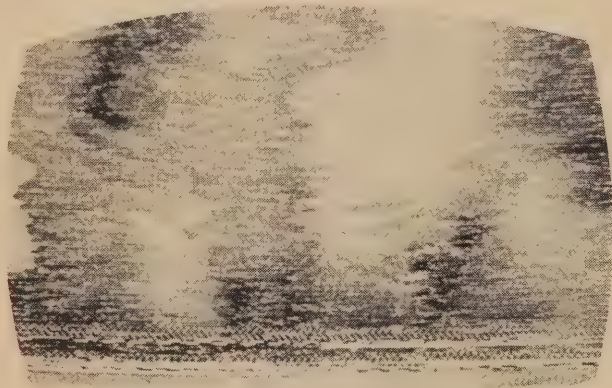
A "Chip"

to comparing a Chevette to a Corvette except the Corvette was the first system and the Chevette was the second (II) system. The first system would later be adopted by CBS for their secure network feeds. CBS could afford \$10,000 per descrambler; HBO and its cable affiliates could not. The first system completely destroyed the audio plus the video; the second system caused minor problems to the video and concentrated on destroying the audio.

Enter DES. The whole concept of DES is that you take a giant photograph and turn an unskilled squadron of monkeys loose with scissors. After hours of cutting and snipping and hacking, there is no piece of the picture remaining more than a fraction of an inch in size and all of those tiny pieces have been dropped into a basket. Now you hand the basket filled with thousands or millions of picture-snippets to a bright person and you say "Put the picture back together just as it started." Our example is a photograph; in this instance we are dealing with an audio track and you are snipping up words and even letters into unrecognizable parts and then asking somebody to rearrange the word or sound track into its original form.

This could be described as an impossible task. So scientists worked out a system of coding all of these tiny parts with keys or pointers. You mark each piece with a key or pointer so that the key helps 'point the way' the piece fits into the puzzle. Now, a reasonably skilled person, adept at reading the pointer keys, would have a fair chance of even-

The Chips Work! - Before and after shots of video using "home made" chip descramblers.



tually making the cut up original go back together again as it was. If that seems like not much of a challenge to you or other jig-saw puzzle enthusiasts, we will further complicate the process by asking you to do all of this in *real time*; that is, everytime our monkey snips out a piece and allows it to flutter into the basket, you have to put at least one piece back into the puzzle in cadence to the fluttering piece. One piece cut; one piece stuck back in. If that now seems like a trick only for those with great hand and eye coordination skills, let's do one more thing; let's encode the pointer keys. We'll make them invisible at first so you have to wear special glasses to see them and then we'll put you and the pile of pieces in a room with discotheque type music that is flicking the yellow, blue, green and passion pink lights on and off at the beat of the music. At best you will get a headache with this challenge.

DES encoded signals, whether video or audio, are giant jig-saw puzzles with the pieces so small that they cannot be reassembled unless each piece or group is marked with a pointer key. Then the pointer keys are coded so that, before you can insert the piece into a reconstructed form, first you have to uncode or extract the key pointer information from each piece. And you have to do this in real time because the transmission is in real time; there is very little entertainment value attached to going back two weeks later and laboriously fitting the pieces back together a slice at a time.

You can chop up voice messages (such as telephone calls), pictures (still or motion), computer data streams or virtually anything else that can be reduced to electronic communication form. The chopping up exercise is easy; putting it back together again is hard. DES makes it possible to put it back together again by providing pointer keys which are in turn encrypted.

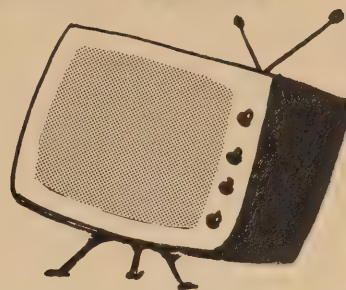
In the real world, where there may ultimately be several million authorized (as in legal) decoders out there, the system must also be practical. That means it must be virtually maintenance free, not subject to false messages, 99.99% reliable and inexpensive to manufacture. These are constraints which the system inventors would rather ignore since *their challenge* was to make the system tamper proof. Unfortunately, in the process of meeting the real world criteria (maintenance free, 99.99% reliable, etc.) several concessions had to be made in the ideal system created by the original design engineers.

One of the most damaging concessions was the decision to actually transmit the full set of key information along with the actual program information. The designers felt that if they chopped up the program (audio) in millions of parts, and then they hid or buried the keys that pointed the way to decryption in the same transmission, they could keep any unauthorized people from putting the message back together in its original form. The decision to transmit the keys, no matter how cleverly they might be disguised, would later turn out to be a poor decision.

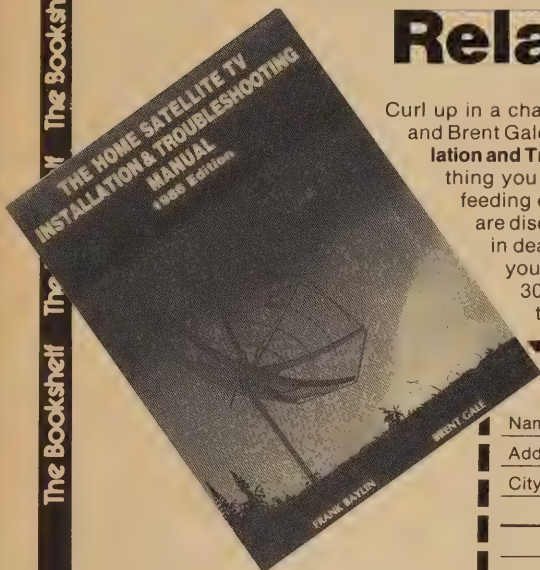
By internal accounts, it took more than three years for the talented engineers and scientists at LinkAbit and M/A-Com to perfect Videocipher. The effort to bust Videocipher involved ultimately a few hundred independent people spread all over the globe each working more or less alone to decipher Videocipher. Eventually a few would make contact with one another and exchange information. *Seven months* after the serious effort began, several began shouting 'Eureka!' *Continued on page 54*

SOMETHING'S WRONG ... NOW WHAT HAPPENS?

Relax...



Curl up in a chair and read Frank Baylin and Brent Gale's **Home Satellite TV Installation and Troubleshooting Manual**. Everything you need to know for the care and feeding of your satellite system is contained in this book. Theory and details are discussed and well illustrated. Step by step guides will give you confidence in dealing with problems. The material is intended for dealers as well as do-it-yourself advocates and is clearly and logically written. The book contains over 300 pages and 300 illustrations. Put yourself in control of this modern technology.



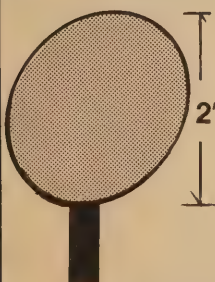
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AT LAST

SMALL DISHES MADE POSSIBLE BY NEW TECHNOLOGY



Satellite communication systems operating in the Ku-band frequency range are becoming commonplace in nations throughout the world. This complete manual by knowledgeable authors Frank Baylin and Brent Gale is built upon new information in this fast-growing field. The authors discuss component theory and operation, design characteristics of Ku-band systems, selecting satellite TV equipment and installation; as well as retrofitting C-band with Ku-band systems. Troubleshooting and repair is also dealt with and the 358-page volume is full of charts, graphs, footprints and illustrations.



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A "Chip"

Continued from page 52

Today, as you read this, there are probably hundreds of people watching the Videocipher scrambled transmissions on satellite who are doing so with equipment they have fashioned on their own to descramble the pictures and sound. Some of these people are involved in planning to distribute either their information or products to others to do the same thing. And that is the thrust of what follows.

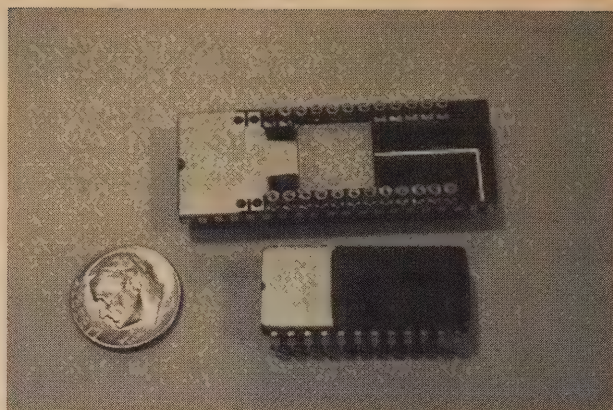
ILLEGAL? Yes!

M/A-Com selected the DES encryption system as a matter of corporate choice. They knew when they did this that the DES system had the official sanction of the U.S. Government and they knew that this sanction carried with it the weight of government protection. Certainly those military and diplomatic messages encrypted with DES being distributed all over the globe are vulnerable to unauthorized interception and if the key to the encryption is DES, then any user of DES was going to also enjoy the protection of the U.S. government. Indeed, one of the rules laid down by M/A-Com when they introduced Videocipher was that the exportation of Videocipher descramblers overseas was a 'no-no.' NSA said that DES was *official U.S. encryption* and therefore any equipment which made use of that technology was considered high tech gear. There are laws which routinely prevent the shipment of high tech systems to overseas points. Videocipher slid in with the rest of the high tech equipment and M/A-Com actually warned anyone distributing TVRO equipment that the shipment of Videocipher units into the Caribbean (etc.) was against U.S. federal law. In a letter received by dealers and distributors in early September, M/A-Com further warned them "The shipment of a VC2000 offshore might be considered an act of treason by the U.S. government."

Nobody really knows how many VC2000s have left the United States for foreign points. It is probable that no fewer than 25% of those now in use are, however, outside of the United States and the actual number may be closer to 50% of those in use. Clearly, while the U.S. market for Videociphers has been setting no records, at least many of the offshore users of home dishes have found the \$400 price tag not insurmountable.

It has been something of a mystery why M/A-Com has not done a more thorough job of policing the distribution of the Videocipher units. It has also been something of a mystery why hundreds of individuals and groups, working to bust Videocipher, have been allowed to continue their efforts to bust the system without some form of federal intervention, or at the very least, a public warning from NSA, the FBI or the Department of Justice. Perhaps, just perhaps, the whole Videocipher system has been a paper tiger from the beginning.

Untested to date in court, the belief of those who have set out to bust the system has been that anything they do must be kept quiet and their activities must remain underground. With the assumption that the sale of how to bust information or the sale of busting-boxes is illegal, to date there has been only limited disclosure of the techniques or technology of busting the system. HBO, in a letter to TVRO trade press editors, recently warned of the sale of boxes which *purport to be illegal descramblers*. HBO made the point that some unethical people were offering for sale descramblers which they claimed were modified to allow free reception of HBO (and other) services, but which HBO revealed were actually



Small But Powerful -

This "piggy-back" chip locks open Oak-Orion boxes.



Busted -

Virtually every encryption system in wide use has been broken.

nothing more than properly authorized descramblers masquerading as illegal boxes.

Here is what we believe to be accurate at this point in time:

1) Someplace between 25 and 100 people or groups of people have now managed, largely acting on their own, to bust the Videocipher coding. The majority of these people have kept their technology secret and probably out of fear of being arrested intend to keep their information quiet, enjoying privately the fruits of their labor.

2) An equal number of people who have not solved the Videocipher puzzle claim they have, and they are offering for sale plans, or equipment, which they promise will assist



Illegal Chips? -

But perhaps permissible in Canada, Mexico and Costa Rica.

you in busting Videocipher on your own. Since their plans (or equipment) are virtually useless and offer no threat to M/A-Com or HBO, these people are not likely to be prosecuted for violating federal statutes that were drawn up to prevent the misuse of DES. At best or worst these charlatans are perhaps guilty of mail fraud laws.

3) A much smaller number, counted perhaps on the fingers of one hand, are getting ready to market the 'real thing,' either in plan/information form or as real hardware you can take home and hook up to your dish system.

If either the DES protection statutes or laws enacted in 1984 have any teeth at all, the sale of information (plans), or hardware to bust a video encryption system is very illegal

within the United States. It may not turn out to be illegal in Canada, or Mexico, or Costa Rica. We'll consider that question shortly. The DES protection statutes are murky and, because there has been no real opportunity to test them in court, their impact is uncertain. The scramble-busting statutes, known as Section 705 of the Cable Communications Act of 1984, is quite another matter. Several suits have been brought using this law since 1984 and the perpetrators of systems or techniques to circumvent scrambled transmissions have routinely lost these cases. There are significant monetary fines (up to \$250,000) and jail terms (to ten years) for getting involved in this sort of act. It is a federal offense and would involve the FBI if that tells you anything.

On the surface, and after study, one must come to the conclusion that even if the Videocipher system is now broken and the information on busting it is widely disseminated, the implementation of the busting technology on anything approaching a commercial scale is extremely unlikely given the present laws.

However, these are U.S. laws designed to protect a U.S. system and, unfortunately for HBO and others, the reach of U.S. satellites carrying programming scrambled by Videocipher is far greater than simply the 48 continental states plus Alaska and Hawaii. All of the countries surrounding the U.S., from Canada on the north to well past Hawaii in the west, Venezuela and Columbia to the south and Bermuda/Barbados to the east are within range of these U.S. transmitted and U.S. scrambled transmissions. Most U.S. laws do not apply in these areas.

M/A-Com counts on several protection levels to keep its system secure:

- 1) The system itself, which is now broken.
- 2) U.S. patent laws, which involve circuit protection to prevent other U.S. companies or individuals from stealing (as in duplicating) patented circuits within Videocipher;
- 3) U.S. DES protection statutes which involve the National Security Agency (among others) in their role as protector of our national secrets.
- 4) U.S. legislation such as the Cable Communications Act of 1984, which created a set of rules to protect scrambled transmissions.

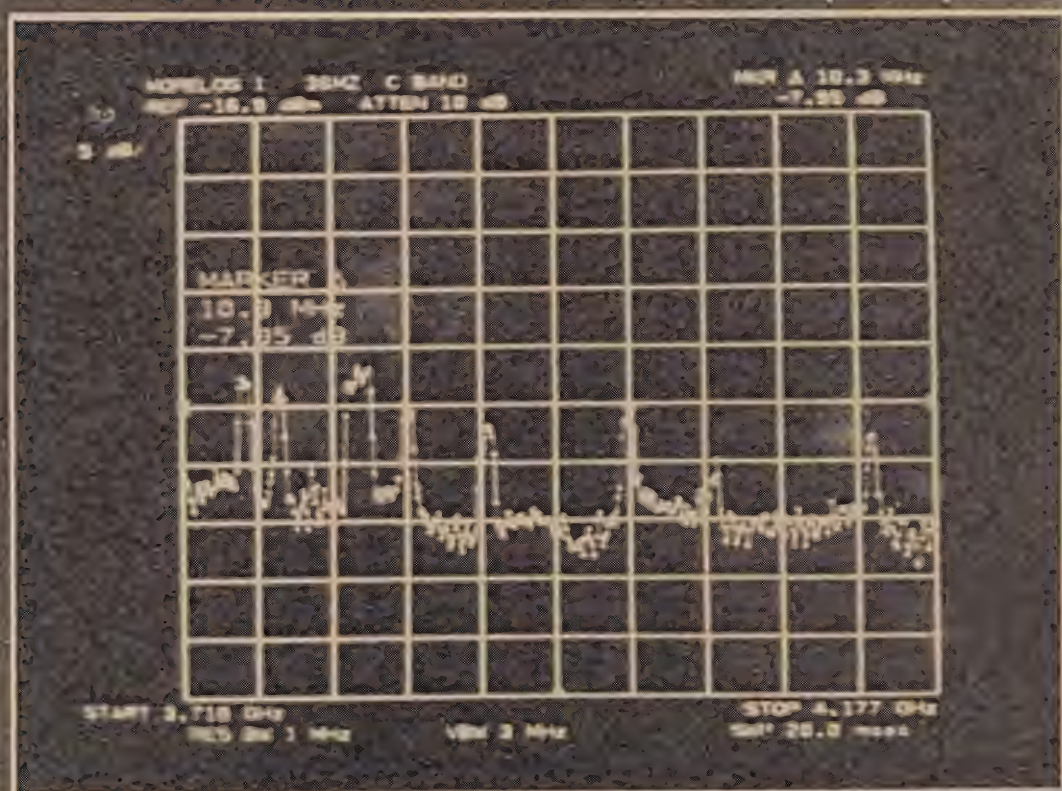
Neither U.S. patent laws, U.S. DES protection statutes, nor U.S. legislation have any impact in Jamaica, for example. If there is no law in Jamaica to prevent somebody from taking a U.S. circuit (patent) and duplicating it in Jamaica, M/A-Com is virtually helpless to protect the circuit itself. If the U.S. government cannot convince the Jamaican government that it should help the U.S. enforce the DES protection statutes or the 1984 Cable Communications act, then M/A-Com has no protection there either.

No accurate count has ever been made of the number of home dish systems existing outside of the 50 states. The best estimates suggest as many as 200,000 home dish systems spread from Canada to Johnston Island to Venezuela to Barbados to Bermuda. Logic tells us that these viewers like the rural American viewers who acquired dishes because local terrestrial television was poor or non-existent, have been inconvenienced by their loss of HBO et al. More than one would-be supplier of Blackcipher boxes (non

Continued on page 67

TUNING IN International Satellites

*How To Search The Sky For
World Programming*



HOW BIG A DISH DO I NEED FOR INTERNATIONAL SATELLITES?

This question has dominated my mail since I wrote "European Report" a couple of HSTV issues back. The straight poop is provided in *Table 1*. The sky map shows the international satellites as "seen" from Shrewsbury, Massachusetts.

Forget about getting European Ku-band satellites unless you live in Europe. The Ku-band birds concentrate their patterns on Europe or in many cases sections of Europe. "Spot" beaming is what Ku-band is all about, and that is the key to the very strong signals enjoyed by the Europeans.

You will need a circularly polarized feed. A linearly polarized DOMSAT feed will impose a 3dB penalty, equal to a 30% reduction in dish diameter. The most powerful international satellite is the USSR's Gorizant 7, located at 14 degrees west longitude. "G-7" irradiates the ground as far west as a line running roughly from Nipigon, Ontario (on the north shore of Lake Superior) to Lafayette, Louisiana. At its western edge of visibility G-7's northern hemispherical beam covers the eastern half of the USA with an EIRP (effective isotropic radiated power) of about 30 dBw. In Shrewsbury, Massachusetts where G7's elevation or 'look angle' above the horizon is about 15 degrees, a 12 foot dish will provide clean video. If you're willing to live with some sparklies on your screen, a nine foot dish will do.

Further west, Danville, Illinois, G-7 is only about three degrees above the eastern horizon. The Earth's thermal glare is a factor here, just as it is in the High Arctic where all satellites are close to the horizon. The brute gain of a large, precision-contoured dish is necessary for clear reception of G-7 in Danville. So much the better if the dish designer has paid attention to feed support design in order to absolutely minimize side lobe levels (and hence noise temperature).

Gorizant 7's "global" beam transponders are 4 dBw weaker when compared to its "hemi" beam transponders. G-7 has only six transponders in all; and its frequency spectrum actually starts at 3,650 MHz compared to 3,700 MHz for most other C-band birds. G-7's spectrum ends at 3,950 MHz; compared to other C-band satellites 4,200 MHz. As noted, all of G-7's transponders are circularly polarized.

South American TV? Currently your best bet is Intelsat VA F11, stationed at 27.5 degrees west longitude and visible as far west as Denver. Programming from Bogota, Colombia; Lima Peru; and Caracas, Venezuela is beamed



From Mexico - XEW-TV, Morelos (F-1), Transponder 2 (=14N).

TABLE 1
INTERNATIONAL SATELLITES VISIBLE IN U.S.A.

Satellite	Programming/ TR. #	Video Format	Beam Type	DISH SIZE (2)	
				Coast	Midwest
Intelsat V F2, 1 West, visible to approx. 77 W	Brightstar	18	Varies	Global 37'	N.A.
	RTP-Portugal	19	PAL	Global 24'	N.A.
	RTP-Portugal	22	PAL	Global 32'	N.A.
Telecom 1, France, 8 W, visible to approx. 83 W	News, sports, entertainment	2	SECAM	Semi- Global 14'	N.A.
Gorizant 7, USSR, 14 W, visible to approx. 90 W	News, sports, entertainment on 5 channels		SECAM N. Hemi	12'	16-25'
Intelsat IV A, 21.5 W, visible to approx 97 W	Embratel- Brazil	11	PAL-M	Global 32'	37'-60'
Intelsat IV F10, International 24.5 W, visible to approx 100W (Great Plains)	Colombia 27.5 W, visible to approx 103WPeru (Great Plains) Venezuela	24	Varies	Global 32-50'	37'-60'
Intelsat VA F11 Colombia 27.5 W, visible to approx 103WPeru (Great Plains)	Venezuela	5	NTSC	W. Hemi 12'	16-25'
Intelsat IVA F1, Argentina 31 W, visible to approx 106 W (E. Rockies)		24	PAL-N	Global 23'	30-40'
Intelsat V F8, 53 W, visible beyond W. Coast	Santiago, Chile	22	NTSC	Global 32-50'	32-50'

NOTES TO TABLE 1:

- (1) Multistandard satellite receivers and TV monitors are necessary to accurately reproduce video and audio information.
- (2) Size required for good (virtually noise-free) video. A 30% reduction in dish size will still result in "watchable" video.
- (3) Dish size requirements increase rapidly as the western limit of visibility for a satellite is reached.
- (4) Transponder output varies.

to North and South America via transponders 1, 3 and 5. These are "western hemispherical beam" transponders; and they irradiate the left-hand one-third of the Earth from VA F11's perspective 22,300 miles above the equator. The eastern half of North America appears to VA F11 on the upper left edge of the globe, greatly foreshortened. South America is entirely visible along the mid-left to lower left of the globe.

VA F11's "hemi beam" transponders hit the U.S. Eastern Seaboard from Florida to Maine with an EIRP of 33.5 dBw. Given the rather generous look angles afforded the eastern U.S. by this satellite (together with the strong signal), a 10 foot dish would seem to be enough. *But as we shall see, it isn't.*

VA F11 - like so many Intelsat birds - is operated in a "backed off" mode. So Colombia's "real world" EIRP is 26.5 dBw; Peru's is 28.5 dBw; and Venezuela (backed-off least of all) is 30.5 dBw.

These three programmers employ a "half-transponder" format. The effect is to "make up" 3dB of lost "system sensitivity" due to their backed off mode of operation. You will need a half-transponder filter or a receiver (such as the

Continued on page 59

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Home Satellite TV

International Satellites

Continued from page 57

Com-66T and Com-3R from Avcom) which features switchable half/full transponder bandwidth operation.

With half-transponder video one enjoys a 3dB increase in receiver carrier-to-noise ratio (CNR), thus increasing TVRO system sensitivity. Result: fewer sparklies or no sparklies at all. The *disadvantage* of the half transponder format is the reduction of the "FM improvement factor", so that the resulting SNR (signal to noise ratio) is not as high as one might expect. The video at or even just above threshold appears grainy, in spite of the absence of sparklies. This is not "videophile" video.

Not listed in Table 1 are Mexico's Morelos F1 and F2, both combination C-Ku band satellites. In the southwestern quadrant of the USA, Morelos's Ku-band transponders do spillover somewhat, but their video content is questionable; this writer welcomes correspondence from HSTV readers who can provide photo-documented evidence of Ku-band video from these birds.

Like all domestic C and Ku band birds, *Morelos F1 and F2 are linearly polarized.*

The C-band EIRP "footprints" of both Morelos birds extend well into the USA, with the 33 dBw contour running roughly through Savannah, Memphis, Denver, Salt Lake City, and Los Angeles; according to published information.

The Morelos 25 dBw contour — again per published information — runs through New York City, Sault Ste. Marie, and Seattle. Down amongst the cornfields of Illinois on a hot August night, United Video's Bill Hartanovich and this writer aimed one of U-V's pair of Paraclype 4.8 meter/16 foot dishes at "M-1".

The strongest video was XEW-TV (Mexico City) at 3990 MHz (equal upper half transponder 14) where we measured the CNR at 6.5 dB; about 2 dB below the Scientific-Atlanta 7500 receiver's CNR "threshold". As the photos show, half transponder video — the format used on Morelos — can be darned grainy even when not grossly below threshold. Now, what does that 6.5 dB CNR tell us about "M-1"? One heck of a lot, as we shall see...

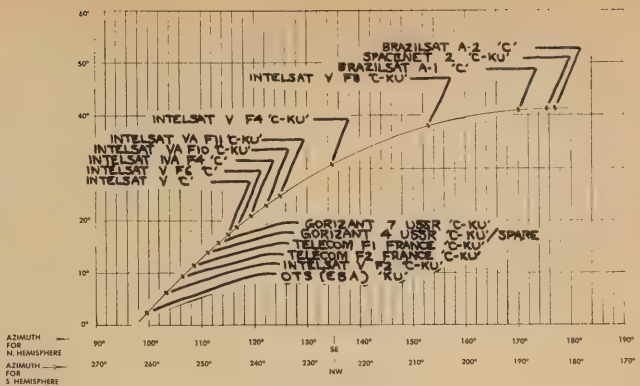
First, we calculate our system G/T:

$$\begin{aligned} G/T_{\text{SYSTEM}} &= G_{\text{ANT}} - \log_{10}(T_{\text{ANT}} + T_{\text{LNA}} + T_{\text{OTHER}}) \\ &= 43.2 \text{ dBi} - \log_{10}(40^{\circ}\text{K} + 80^{\circ}\text{K} + 5^{\circ}\text{K}) \\ &= 43.2 \text{ dBi} - \log_{10}(125^{\circ}\text{K}) \\ &= 43.2 \text{ dBi} - 20.95 \\ &= 22.25 \text{ dB/Kelvin} \end{aligned}$$

This may seem a bit shy for a 4.8 meter dish at first glance; but consider this: it wasn't assembled by factory trained technicians nor did they have the means at their disposal to evaluate their work.

While using the dish on prior occasions it became apparent that the "first side lobes" on both sides of its "main" lobe were too strong, and there is a "null" between the main and side lobes. If you're just matching video and not a spectrum analyzer you should see the video abruptly "pop up" on screen and just as abruptly "pop off" as the dish is scanned across the satellite. Even with the 36 dBw EIRP signal of a US satellite. But that's not what happened.

The observations made by this veteran antenna designer/installer suggest that the feed is situated about 1/2 inch outside the dish's focal plane. The symmetrical off-axis



TVRO SITE LOCATION SHREWSBURY, MASS., U.S.A.

LATITUDE 42°16'N LONGITUDE 71°41'W

PREPARED FOR HOME SATELLITE TV MAGAZINE

PREPARED BY J. K. VINES

DATE SEPTEMBER 24, 1986

behavior of the dish is reliable evidence that the surface is accurately-contoured and without any large-area zonal errors. The surface appears to be excellent; a real tribute to the Paraclype design and to the United Video technicians who assembled it.

The foregoing G/T calculations reflect the estimated "real world" gain and noise temperature of the 4.8 meter Paraclype dish. I assure you I have seen much, much worse performance from similar-sized dishes!

Now to calculate Morelos F1's EIRP at the United Video/Monee, Illinois "Chicago Teleport":

$$\text{EIRP}_{\text{SAT}} = \text{PLF (Path Loss Factor)} + \text{CNR}_{\text{REVR}} - \text{G/T}_{\text{SYSTEM}}$$

"PLF" or path loss factor is a homologation of variables, most notably receiver I.F. bandwidth and the path length from the satellite to the TVRO site. Now to plug in all of our numbers:

$$\begin{aligned} \text{EIRP}_{\text{SAT}} &= \text{PLF} + \text{CNR}_{\text{REVR}} - \text{G/T}_{\text{SYSTEM}} \\ &= 39.6 + 6.5 \text{ dB} - 22.25 \text{ dB/K} \\ &= 23.85 \text{ dBw} \end{aligned}$$

So 23.85 dBw was the strongest EIRP of any video transponder observed on the spectrum analyzer. Across the C-band spectrum, Morelos F1 ranged from a low of 21.3 Dbw to a high of 26 dBw, substantially lower than the predicted 28 dBw for the U-V/Chicago Teleport site. The reason for the lower-than-expected EIRPs from M-1 may be that the transponders are not being fully saturated by the Earth-based uplink stations in Mexico; in which case these (like many Intelsat transponders) are being operated in a "backed-off" mode.

It had been a long day for both Bill and me. We wanted to do a comparison run at Morelos with one U-V's two new 9.15 meter (30 foot) Andrew Corporation dishes. We agreed that as soon as our schedules permitted we would indeed appropriate one of the Andrews; and then we will see how well we can clean up the grainy Morelos half-transponder video.

That will be the subject of a future report. ■

NOTE: Letters to Jim Vines can be mailed to P.O. Box 448, Monee, Illinois 60449-0448. The fast-moving Vines can (sometimes) be phoned at 312-534-0889.

New Channels FOR DISH OWNERS

*You'll Be Surprised At The Programs
You Find When You Start Moving Your Antenna*

BY DOUG STEVENSON

Over the last five years, television has gone through more dramatic changes than ever before. We find the power of the Big Three networks is becoming diluted as specialized stations available through the miracle of satellite television represent an increasing percentage of the overall viewing public. Where once the ratings game had to see which one of the two, then three networks you were watching, now a hundred choices are possible.

Since January of '86, when HBO made scrambling a reality, dish owners who once never moved their antennas off of Galaxy 1 or Satcom 3, are making full use of the computerized tracking systems now available, to scan the skies for new and varied programming. These people realize that there are still many, many channels available, each one appealing to its' own audience. After watching satellite TV for several years, the home satellite enthusiast has seen that every year there is a turnover of channels going out or breaking into the TV broadcast business. Some last a year or two, others only a few weeks. But always, there are a few that go on the road to success, getting a firm foothold in the TVs across America and beyond.

One of the great hopes for satellite dish owners to place their faith in was that, as some signals began to scramble, other unscrambled programming would take its place, "We need advertiser supported premium programming!" came the cry, as HBO and movie channel closed the doors to the free ride we were lucky to get in the early years.

Venture capitalists and new entrepreneurs hoping to jump on the satellite movie bandwagon are finding the ante is stiff, if they want to play in the big leagues of first run movie channels. Star studded hits straight from the theaters and video markets cost several million dollars each to show a limited number of times. The monthly programming budget for HBO is upwards over 30 million dollars. Then there is the expense of uplink time and the staff. Starting a new channel is a serious investment in anybody's book.

Getting advertisers to spend big money on airtime is no easy task. They want a guarantee of how large an audience their commercial will receive. New channels just starting up can only hope to build an audience over a period of time by

providing quality entertainment, which we know costs big bucks.

So for now, one thing we see most all the new stations have in common is that the primary companies advertising are the 800 number people selling magazines, records, financial advice and the like. Most of these guys play it safe by basing what they pay out in advertising dollars on how many calls each ad generates. And until the channel gets its audience together, it will take some time to draw in the bigger advertising accounts.

Of all the new services, the one making the most serious stab at becoming a real contender is the Carribean Super Station. Broadcasting 24 hours a day on transponder 16 of Westar 5, CSS offers a large variety in programming for a broad appeal. In the morning and evening slots, to my surprise, are the NBC Today show and the NBC evening news. When the advertising spots come along, instead of the commercials you would see on your regular network, CSS inserts its own commercials. After the Today show, Phil Donahue comes beaming in, possibly another repeat for those with good local reception, but for the thousands of people living in areas of fringe or marginal reception, the clear unscrambled shows are greatly appreciated.

Following in the super station format, CSS has a certain amount of old reruns such as "Peter Gunn". A feature

Continued on page 62

Plentiful Programming - "After scrambling" may mean more to see, not less for those with home satellite systems. Entrepreneurs are starting new advertiser paid shows on a wide variety of subjects from country music to movie favorites to sitting in the sun on the islands. The only requirement is that you swivel your dish in the right direction—what's on the air, here, is free for the taking.

ITN

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New Channels

Continued from page 60

called "The Sundown Movie Theater" brings on the old classics such as vintage Ronald Reagan, and late at night, on the "Junk Film Festival", you can expect about anything from Kung-Fu to science fiction. Many of the movies are more recent from small production companies. There is also some quality children's programming such as animated films. One feature shown was "Cat on a Hot Tin Roof" starring Jessica Lange, a show originally seen on Showtime.

For music fans, there is a lot in store on CSS, anything from segments of the Country Music channel, to full fledged rock and roll. On a couple of occasions, a rock festival from Montreux, Switzerland played the sounds from such big names as Roger Daltry, the Eurythmics, Genesis, the Outfield and many more. Earlier in the year this same festival was shown on MTV.

One type of music I venture to say you will see on no other channel comes to us direct from the islands. Marimba and mariachi work well to entice us to the festive nightlife of the Carribean.

In fact, it seems that much of the purpose behind CSS, is to promote the benefits of an island vacation. Our senses are visually appealed to with panoramas of sunny white sand beaches, complete with strolling bikinis, the under water beauty of the coral reefs and their teeming ocean life, sailboating, the limbo, good food, all this could be ours by following the simple instructions to dial 1-800-ARUBA.

Aruba is an island in the Carribean, 15 miles off the coast of Venezuela. This is the home of station owner Francis Lacle, who originally entered the TVRO game founding an installation company called Carribean Satellite Systems. Pursuing the commercial market of hotels and motels, as well as home systems for individuals throughout the region, Lacle felt that the best way he could secure unscrambled programming for his systems was to start his own channel.

Presently operating from an uplink in Orlando, Florida, CSS is the only station promising to serve this special area. But the plans don't stop there! Their programming crosses all boundaries and will serve as a good replacement for the other superstations that plan to scramble this year. Other ideas CSS wants to develop are shows of their own with viewer call in participation on 800 and 900 numbers. Possibilities include talk shows, voting on what movie to watch and maybe even how it will end. While the idea has been around for awhile, so far MTV is about the only station that regularly involves viewers in a call-in vote. This could be a real draw for CSS, something to be watching for.

With an eye to the future, the Carribean Super Station is one of the more promising newcomers to beam down from the skies. If you would like a program guide to the Carribean Super Station, send \$10 to:

Program Guide
C/O CSS
Emastraat 51
Oranjestad, Aruba

One new service that is perhaps the most unique, is the International Network. Located on transponder 19 of Westar 4, ITN offers a selection of films from all over the world. Really, there is no other channel that gives you the regular opportunity to view the lifestyles of other countries



International Network - offers films from around the world.

and to learn the viewpoints of people on the other side of the planet. While perhaps the films are not as spectacular or loaded with special effects like our current American movies, still it is refreshing to find something totally different on which to focus our attention. Generally, the films deal with human relationships. Love stories, drama light and intense, and sometimes there are musicals or comedies. One selection was about a runaway boy taken in by another family and the events leading to his return home. Another, from Germany, depicted a man and woman meeting each other through one of those computerized dating services (called a marriage bureau in the movie). She was a city girl, he a farmer. Although she is hesitant, her attraction for him cannot be resisted and romance blooms. There was even a cooking show, complete with a French chef, all spoken in French.

Among the countries represented so far have been France, Germany, Belgium, Poland, Yugoslavia, Italy and more. Most have subtitles, allowing you to hear the natural tones and inflections of the actors and actresses as they express themselves.

We learn that in this wide world, perhaps we are not so different from each other after all. People everywhere are seeking the same things, love and understanding, no matter what the language. It is interesting to watch how different cultures relate to similar situations. Often we are so immersed by the way things are here that we do not see much of what it is like in other parts of the world. The International Channel presents a slice of life with enough variety to keep you interested and watching.

Unless you are a real night owl, to fully appreciate the International Channel, you will need to utilize your VCR and its handy feature, the automatic timer. For you see, showtime starts at 12:30 AM Eastern time through 8:30 AM. By programming your VCR to begin recording after you are in bed, you can review the features from the night before the next day and see if any thing catches your interest. Recording at the slowest speed will get you up to six hours on tape. You can always erase everything and use the same tape over and over.

If you like the flavor of foreign films and are ready for a little variety, don't overlook the International Network.

Music television is a phenomenon that has had one of the greatest effects in changing the way we experience video. MTV has become a household word, opening the door for all other types of music to follow. With rock and country sound being well represented in the microwaves,

up on Satcom 4, transponder 15, a new network charts fresh ground. The American Music Entertainment Network, otherwise known by the acronym A.M.E.N., brings us the best in gospel entertainment. Coming out of Music City USA, Nashville, Tennessee, AMEN mixes videos from name artists like Amy Grant and Ronnie Milsap, with in house productions of lesser known, but still very talented performers. Some of the music stays within the boundaries of traditional gospel four part harmony, while many of the new young singers have a totally upbeat pop sound complete with synthesizers and electronic drum machines. Occasionally, there will be a video that seems totally out of the gospel format, usually in the country vein.

Currently AMEN is on the air from 12 pm to 12 am, with the remainder of the time being used for a new concept in home shopping. Between the sales pitches for their products, the Country Store shows tapes of the old Tennessee Barn Dance and Grand Ol' Opry. Fans of old time country music will be in hog heaven when they tune in to the performance some of the country greats, like Hank Snow, Little Jimmy Dickens, June Carter, Ferlin Huskey, the list goes on and on. It would seem that there must be a limited

"Plans for the future include a movie channel, a children's network, (with Hanna Barbara cartoons and family films), a music video network spiced with more movies and an agricultural report station."

amount of time one could watch a shopping channel before moving on to something else, but this new angle should be a good way to keep people watching.

There is no doubt, the world loves music, in just about any way, shape or form. The American Music Entertainment Network offers yet a new variation on the music channel theme and the Country Store gives home shopping a new format. With gospel music's popularity on the rise, crossing over into the pop charts, combined with a new way to get great bargains while watching some of your favorite stars, survival looks good for these new stations.

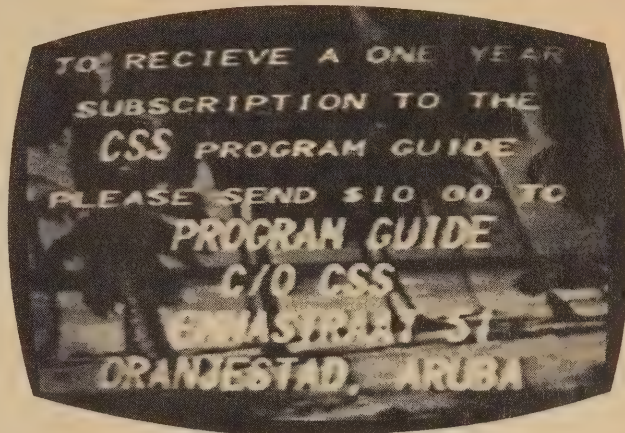
Located between Satcom 3 and Telstar 3, is a new satellite which goes by the initials, ASC-1. This is the home of two new services, Niteline Television Network, generally a religious format, and The NUSTAR Network. Pledging a twenty-four hour format, so far Nustar has only been transmitting a few hours at night. Generally, the fare has been old black and white movies with an occasional short subject.

To find Nustar and ASC-1, go to Galaxy 1, transponder 11, CBN. This will start you out on the right polarity format. Then move your dish east, watching the images of Satcom 3 go by, and almost immediately you should see either NUSTAR's test pattern or a movie. To find the Niteline Network, simply do the same process, starting on WGN, transponder 3 of Galaxy 1. You should have no

trouble finding ASC-1, so if you don't see anything, they're probably just not on the air.

With up to 2 million dishes in the field already, and estimates of up to 6 million by 1990, the international audience is sure to attract a whole number of little independant networks trying to claim a space and a piece of time on your TV.

If we want advertiser supported channels to continue on, we can encourage them along with our cards and letters so



Caribbean Super Station (CSS) - offers movies and music.

they can spread solid roots and grow toward bigger and bigger sponsors.

After all, if you want to watch a movie, you can go down to the local video warehouse and get an armload. In the long run, we may find that it is the specialty stations and the super stations that become the satellite survivors.

Programming Update

On display at this year's annual satellite convention in Nashville, Tennessee, were several companies offering new programming to the home satellite community.

Home Dish Programming plans to start with the bold move of launching four new services at once. Although the channels will be scrambled, the annual fee for all services will be only \$95 per year which will include the leasing of their own decoder. Encryption of the channels was required in order to secure a contract with the distributors of the newer, quality movies.

Plans include a movie channel, a childrens network, with HannaBarbara cartoons and family films, a music video network spiced with more movies and an agricultural report station.

Look for them to begin unscrambled tentatively on November 1, to be followed by encryption when the majority of their decoders are in place.

Another company seeking support proposes to uplink the three networks, CBS, NBC and ABC. They hope to fill the need for areas of the country with poor or no reception from their local affiliates. Besides the standard network fare, this group plans to fill a 24 hour time slot by including locally produced programs from network affiliates around the country. More later on any future developments here.

Those folks lucky enough to have a KU system in place, are benefiting for a short time more to an unscrambled Showtime.

Stay tuned for more Transponder Updates! **A**



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Rear Projection TV

Is It a Fad Or A Trend In Today's Super TV?

BY JIM VINES

Unlike large, cumbersome curved-screen video projection systems, rear-projection TV is fully self-enclosed and has a flat screen.

The first rear projection TV I saw was back in 1978 and it was a disaster. You had to sit a good twenty feet from the screen and the fall-off in off-center sharpness and brightness was still severe. Some folks bought them anyway, proving that their pocketbooks were bigger than their eyes.

Rear projection video technology has advanced drastically in eight short years. The best equipment produces video that is bright, contrasty, and sharp.

In spite of these improvements, casual shoppers retain strong prejudices against "big screen" TV. While buying my Mitsubishi 45 inch TV at Marshall Field's last year, I overheard the following remarks:

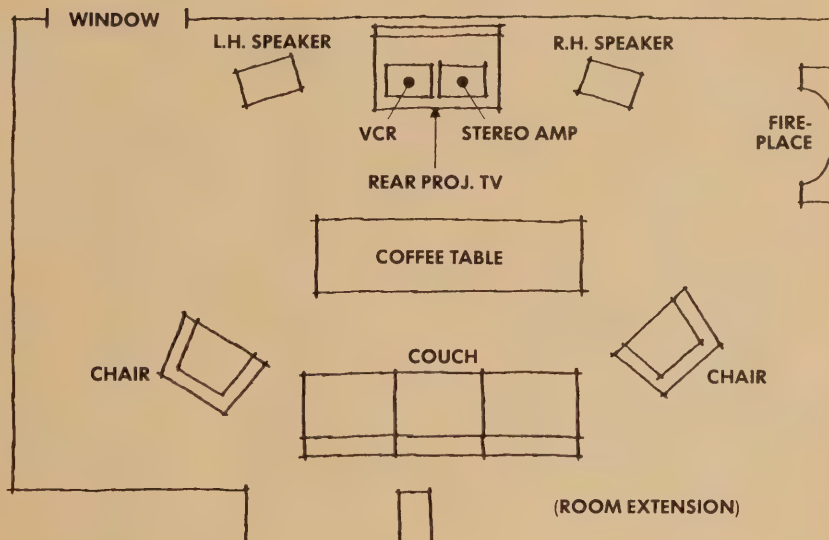
Husband (standing scarcely four feet away and looking down at screen): "That looks awfully DIM."

Wife (approaching): "It looks OK, from far away but turns dim when you come close to it."

Son (also near the screen, pacing side-to-side): "You can't see much unless you're centered."

All of the above criticisms are valid and true, if you insist on *standing up and looking down* at the rear projection unit's screen. But if you will sit down or otherwise place yourself on the same level as the screen, you'll

Big Screen Power - Today's 45-inch rear projection TVs are revolutionizing home viewing. They're sharper and brighter. When viewed from a "sitting down" position, they're contrasty and can be viewed far off-center. (Older sets had to be viewed dead on.) Combined with satellite reception, the big screen TVs at last bring theatre viewing home.



FLOOR PLAN: 14'x26'. VIEWING DISTANCE (TV SCREEN TO BACK OF COUCH = 9½ FEET).
SPEAKER SEPARATION APPROX. 10 FT.

discover that it's bright, it's contrasty, its sharp, and it can easily be viewed a good 50 to 60 degrees off-center.

To a greater or lesser extent the manufacturers of rear projection TVs have incorporated screen designs which create a "fan"-shaped illumination pattern; so that when you sit down the picture's impressive, even if you're far off-center.

These viewing techniques were discovered while watching the four (!) Mitsubishi 40 inch rear projection TVs in use at United Video's Chicago Teleport. This is the facility-located near rural Monee, Illinois - that uplinks super station WGN-TV to Galaxy One.

Sharp? Back in early 1985 when U-V took delivery of the four Mitsubishis they checked into resolution with a satellite test pattern. According to Bill Hartanovich, (Manager of Satellite Operations and Engineering), "We found that these units would resolve 400 lines over almost all of the screen area; with some fall-off only in the corners." The models in use at U-V are the VS401R, a 1984 model. As expected, there have been improvements.

Bright? My 45-inch unit, a 1985 model (VS457R) was rated by MGA at "only" 150 footlamberts, somewhat less than the currently available VS459R's 170-rating, and substantially less than their 40-inch units; which are rated at 205 FL's. Yet in our basement rec room the VS457R is so bright that I have the *brightness* set about halfway and the *contrast* at *minimum*.

Color level? You can achieve vivid colors without excessive graininess or bleeding, as the accompanying photos demonstrate.

Off-center viewing? I photographed my VS457R from a good 40 degrees off-center and the results speak for themselves.

IN-HOME OPERATION? The Vines family's rec room dimensions are 14 by 26 feet, although there is actually an L-shaped appendage which we don't count in here. As shown in the accompanying floor plan, we use our big screen along the room's *short* axis. We do so for several reasons. For starters we wanted the screen to extend a large angle from our seated perspective.

Continued on page 77

Upgrade

Continued from page 33

ratings of the larger dishes. The 10' dish, however (mesh or solid), is still considered the standard size in the industry. Those consumers looking for vast aesthetic improvements in TVRO will not find them in the dish department. For the time being, the satellite dish may remain the least affected piece of hardware on the satellite market.

One special note for those consumers looking ahead. Mesh dishes so far are not compatible for Ku Band. Solid dishes are. The holes in the see-through dishes, which are not large enough to affect picture quality in the C-Band, aren't able to capture a KU-Band signal. Solid dishes may have to be retrofitted, but for the most part will be compatible with TVRO's signal band of the future.

4. LNAs Of all the components in TVRO, your LNA (the unit attached to the feedhorn of your antenna that strengthens the signal) is the most overlooked, but maybe the most important. Treated as a loss item during

the scrambling crunch, LNAs were dumped on the marketplace, creating a price war and adding to the general confusion already surrounding the unit. The average price of a 120 degree LNA now hovers around \$20. To put this into perspective - if you were one of the several hundred thousand of consumers who purchased one three years ago, you paid around \$300 for the same unit. This indispensable component item's value is supposed to be based on degree. A 120 degree LNA will do the trick, but a 65 degree model gives you less visual 'noise' in your picture and therefore is more expensive. The lack of standardization for the LNA has also made it harder for the potential dish owner who's renewing his system, to make sure he's getting what he needs.

The LNA's sister component is the LNB. Designed for noise reduction for multiple TV/receiver set-ups (Block Down Conversion), this unit is fast becoming popular and more reliable than the low noise amplifier (LNA). Experts predict it should overtake more than half of the LNA market by year's end. Whatever the case, consumers are vying for the

higher-priced lower noise amplifier in both markets.

All of this brings up to pricing and the possibility of total system renewal. TVRO has gone through the shakiest year of its existence. The scrambling issue, coupled with product glut and "junk-dealers" who flooded the market with poor quality merchandise has made '86 a good year to sit out if you already had your system intact. What is settled, as far as pricing is concerned, is low-end and high-end price ranges on total systems. Your mid-range systems have all but been eliminated. In fact, most of your mid-range systems are now being created by customers who are trading in, adding and subtracting from their existing systems. Dish owners studying the market place the second time around are in a better position to pick and choose the equipment just right for them.

Perhaps your final consideration when looking to upgrade in TVRO should be the VCR. The increasing popularity of the unit, coupled with the increasing number of TVRO channels make it a must-have item for satellite buffs looking to improve their home entertainment needs. ▀

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M/A-Com, unauthorized but functional descramblers) is targeting these 200,000 home dish systems for their product. The products would be manufactured *outside* of the USA and marketed solely *outside* of the USA.

Given this scenario, which until it happens must be labeled conjecture, one must assume that somehow, somehow, Blackcipher products will find their way back into the United States and will end up being marketed through a U.S. underground. At least one Taiwanese firm, claiming to have a completely engineered and operational Blackcipher system ready to put on the production line, spent the better part of this past fall conducting market research into distribution channels for its proposed product.

There have been similar activities in U.S. commerce prior to the Videocipher situation. Not many years ago, firms in Taiwan and Hong Kong and Korea were busy building Apple-copy computer products for sale worldwide. You could walk into shops in Hong Kong and acquire Apple II series computer products for a fraction (1/3 to 1/2) of their price stateside. These forged duplicates were precision copies down to the Apple product identification labels and tags. It was only after their aggressive oriental creators tried to filter the products into the U.S. marketplace that the U.S. Department of Commerce swung into operation to close our borders to these forgeries. Eventually, through diplomatic pressures, the U.S. was also successful in forcing their high visibility in Hong Kong shops into the background of trade and commerce.

How This Affects You

The question is no longer *if* they bust Videocipher. The question now becomes how will authorities handle the first appearance and attempted distribution of the Blackcipher boxes? It is very unlikely that your friendly, corner satellite store will offer them for sale; above or below the counter. Not unless you are reading this on Cayman Island in the Caribbean.

But the threat that this *could happen* may ultimately turn out to be a very powerful tool in the ongoing battle to negotiate lower rates for both descramblers in the U.S. and software (programming services) in the U.S. as well. If the creators of Videocipher realize that Asian and other production efficiencies are at work to lower the price from the present \$395 per descrambler, they may well react by discovering a few production efficiencies of their own. If the program suppliers such as HBO are repeatedly told and told again that \$12.95 per month is too high a price to pay for home dish service, they may also recalculate the rates that should be charged to home dish owners; *after they realize* that home dish owners do have another option available to them. Even if that option is illegal.

So out of this high tech battle there is a glimmer of hope that in spite of the apparent laws to the contrary, some real marketplace good may come from these hackers who have tackled Videocipher as a personal challenge. This is not the way M/A-Com and HBO foresaw the introduction of scrambling of course but these are fast moving times where predictions of the future are more often than not outdated before the printer's ink is dry. *A*

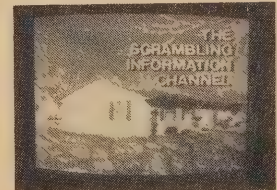
Bob Cooper is publisher of Coop's Satellite Digest, a monthly trade journal for the worldwide home dish industry.

SCRAMBLE-FAX SCRAMBLE-FAX SCRAMBLE-FAX

by Bob Cooper

IF satellite scrambling is important to you, here is a single, authoritative source of timely, confidential information of great value; **SCRAMBLE-FAX**. Bob Cooper is routinely gathering all of the important scrambling facts and combining them into a single AIR-mailed 'Newsletter' designed to give you all of the facts you need in one, convenient, timely place.

SOURCES for pirate decoders, reports on export problems and equipment interfacing solutions. Advance warning on who is scrambling, when, and how (more than 37 channels have already scrambled; 20 with Oak Orion). All of the important, hard to locate information, in one publication.



COMPLETE, up-to-date listings on which receivers interface with the 'E' and 'E/B' version Videocipher descramblers; full table listing or who is scrambling, using which system. Technical tips for interfacing descramblers with commonly available receivers.

STATUS reports from DESug (DES Users Group) on progress made in 'busting' the videocipher coding; analysis of plans and books offered in field and value of each to users. Conversion of non-compatible equipment to Videocipher interconnection, and, much-more!

WESTAR Communications/Westcom, the Toronto area alleged manufacturer of 'pirate decoders' for HBO/Showtime and other Videocipher type scrambled services reportedly has been sold to a new group of investors, all Canadian. The firm has been offering their pirate-type decoder unit for \$500 (US) for several weeks claiming it decodes all Videocipher scrambled video plus audio signals. Attempts to locate the firm other than through their 800 telephone number (1-800/265-5675) typically meet with failure and the firm is quick to explain that it would be inappropriate for them to identify their actual street address location (SCRAMBLE-FAX suggests you try 504 Iroquois Shore, Oakville, Ontario, and 416/842-2877 as their non-800 telco).

AND you are invited to call 305/771/0575 anytime for a free, 3 minute pre-recorded 'SCRAMBLE-FAX Hotline Update' report; the latest in fast-breaking scrambling news to augment your printed copy of SCRAMBLE-FAX. To order SCRAMBLE-FAX, call 305/771-0505 with your VISA/Mastercharge card number and expiration date. Or send \$10 check or money order to the **CSD** address below.

SCRAMBLE-FAX tm by Bob Cooper

305/771-0505, or, free 'Hotline' service 305/771-0575. To order by mail, \$10 in US funds to CSD Magazine, P.O. Box 100858, Ft. Lauderdale, FL 33310.

Searching For SOUND

How The Complete System Can Receive Independent Satellite Audio

BY DAVE SHELDON

Many people have purchased satellite systems because there are so many more programs to watch than on conventional TV. However, watching isn't all that can be done with your system. There are numerous radio networks on satellite, too. This makes listening to your system just as interesting as watching it.

SUBCARRIERS ABOUND

In most programming guides, satellite radio networks are listed as "Subcarriers," or "Audio Services." for example: The video signal on Galaxy 1, transponder 2 is WGN from Chicago. Also broadcast on this transponder are a number of audio signals. The soundtrack for the video program is just one of the subcarriers. Also broadcast are five stereo radio networks. These are 24-hour programs which originate from a variety of sources:

The Moody Broadcasting Network features religious programming.

Star Station, Country Coast-To-Coast, and Stardust are commercial music stations.

WFMT from Chicago broadcasts fine arts information and classical music.

There are over fifty audio services like these on most of the C-band satellites, broadcasting a variety of music, news, sports, and talk programs via satellite. Just like the locally-broadcast AM/FM stations, some satellite radio programs are in monaural, and others are in stereo. By connecting your satellite receiver to your stereo amplifier and speakers, you can get the full benefit of these unique radio networks, plus the added fidelity of stereo TV.

HOW TO TUNE SUBCARRIERS

Most satellite receivers can tune these subcarriers separately from the video soundtrack. Some, like Chaparral's new Sierra II receiver, are pre-programmed to select the radio networks from a menu displayed on the TV screen. This convenient feature allows you to store your favorite

satellite radio networks without altering the audio tuning for the video soundtrack.

The receiver must have a "narrow" audio bandwidth to receive most of the radio networks clearly. The bandwidth is a measurement of the width of the audio signal. The monaural video soundtrack uses a bandwidth of about 280 KHz. This is called wide band. Most of the radio networks use a bandwidth of about 150 KHz. Your receiver may be equipped with a switch that allows you to select the narrow bandwidth. On more current microprocessor-controlled receivers like the Sierra II, this switch function is controlled by the software, and may be selected and stored for a specific channel.

Tuning a radio network on your satellite receiver is easy:

First, refer to the programming guide to find the satellite and transponder on which the subcarrier is broadcast. The information shown there will indicate the name of the audio service, the tuning frequency (or frequencies for stereo broadcasts), the audio mode (mono, discrete stereo, matrix stereo, or multiplex stereo), and the bandwidth.

Next, select the correct audio bandwidth and mode

Continued on page 70

The Ultimate Home Entertainment Center - It offers not only TV, but also presents dynamic stereo sound. For the satellite system owner, a wide variety of audio programming including regular "talk" shows is available on subcarriers coming from many of the "birds." A total system is pleasing not only to the eye, but to the ear as well.

*Photo courtesy of Custom Woodwork & Design,
Bedford Park, IL.*



Searching Continued from page 68

on the receiver, and tune the left and right channels to the frequencies shown in the guide. Some receivers show a display of the audio frequency on the front panel or TV screen. This is helpful for tuning the audio. If the receiver does not have a display, you can tune the subcarriers by ear. This may require careful adjustment of the audio frequency, especially if the subcarrier has a very narrow bandwidth. If the receiver has only monaural audio, you will only be able to receive one side of a stereo broadcast.

Finally, set the volume control to the desired level. You're now listening to a satellite-broadcast radio network. Depending upon the type of receiver you are using, you may be able to store the tuning for the current channel so that whenever you wish to listen to the radio network, you simply recall the channel.

PEAKING SUBCARRIER PERFORMANCE

Because most of the subcarriers use narrow bandwidth, they may have a lower volume and slightly "thinner" sound than the wide band video soundtrack. This is normal. A

graphic equalizer can be helpful to peak the subcarrier performance. This component is connected between the satellite receiver and the amplifier. Many home stereo systems have a built-in graphic equalizer.

A graphic equalizer is basically a sophisticated tone control which allows you to alter the sound quality of an audio signal by raising or lowering the levels of a number of narrow frequencies within the signal. By "tweaking" the signal a little, you can make the satellite radio networks sound just as good as locally broadcast FM radio.

If your receiver is mono-only, or lacks a narrow bandwidth filter, it is still possible to receive stereo subcarriers by adding a stereo adapter to the system. This component takes the baseband signal from the receiver and sends the left and right audio channels to your amplifier and speakers.

Whether you plan to upgrade your existing receiver with a stereo adapter, or you decide to get a new stereo receiver, using your satellite system to receive satellite audio can add a lot of enjoyment to your home entertainment. Your satellite dealer can recommend the best alternative. Happy listening! 🎧

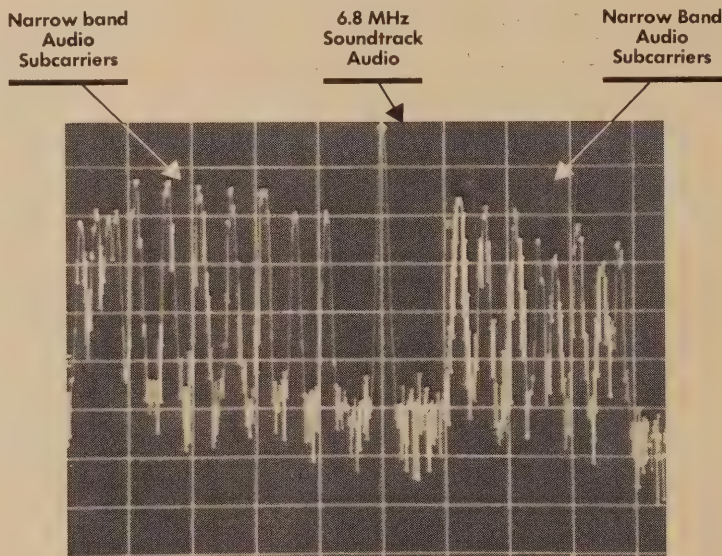
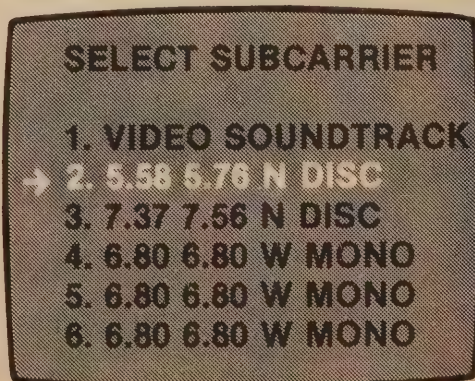


Photo taken from oscilloscope display of audio signal from Galaxy 1 transponder 3.

Chhparal's Sierra II features an on-screen menu that allows the listener to directly access each subcarrier stored on the current transponder.



This sample shows several of the channels on F3 and G1. The subcarriers for the video soundtrack may also be in stereo as shown.

SATCOM 3R 131° [F3]	GALAXY 1 134° [G1]	CH.
Left Channel 5.8 MHz Right Channel 6.62 MHz Wideband/Matrix Mode	CBN Cable Network	11
EWTN	Request TV Cable Network	12
HBO (west) (enc.)	C-SPAN	13
	The Movie Channel (s.s. 5.8-6.8) (west)	14
VH-1 digital stereo	WOR-N.J. TEST (enc.)	15

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Home Satellite TV is Just at the Start of Its Explosive Future

In suburban backyards and alongside country farmhouses, home satellite TV systems are springing up all across the country.

Already there are over a million TVRO (Television Receive-Only) systems in place in the U.S. alone, and experts predict that by 1990, a remarkable 60% of U.S. homes will have a satellite dish.

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The Games Go On

In Spite of the Threats The Sky Is Clear

If you're a pro football fan, the thing to have, besides a crystal ball that tells you who'll cover the spread, is a satellite dish.

Without a dish, you get two, maybe three, National Football League games on any given Sunday. With a dish, you get more than you can possibly watch at one time.

There are 13 NFL games on a football Sunday, unless it's a Thursday night game. On those occasions, there are 12.

Dish owners used to get all the games until last year when NBC began using the Ku band frequency.

NBC still uses C-band for one or two of its games each Sunday because NBC affiliates in Alaska and a few others in isolated areas are unable to pick the Ku band. Therefore, games being televised by those affiliates must get a C-band frequency. CBS still uses C-band for all of its telecasts.

So the NFL world is still there for the taking.

For instance, on September 21, the third week of the season, there were 12 games played and 9 were available to

TVRO owners with standard C-band units. Only three were not available.

For dish owners who aren't satisfied with getting only 9 games, those who want them all, that is still possible. The all-out fanatic can either invest in a separate Ku band unit or purchase an adapter for his existing unit, although not all C-band units can be converted.

Home Satellite TV has continually kept readers abreast with the latest information on Ku band units and Ku band conversion. Also, your local dealer should have up-to-date information.

More and better Ku band equipment is becoming available and prices are coming down, says Jim Buckley, owner of Santa Anita Video in Arcadia. "Most units can be converted for around \$1,000," he added.

John Morris, co-owner of Legends bar-restaurant in Long Beach, which was featured in the November issue of *Home Satellite TV*, said he spent \$1,800 on a separate Ku band receiver. It is one of the four dishes on the roof of Legends.

The choice is up to the dish owner. If he wants all the games, he invests in a Ku adapter or separate unit. If he is satisfied with 8, 9 and sometimes 10 games, an ample number for most appetites, that's what he gets with a standard C-band dish.

The other concern of TVRO owners who are principally interested in NFL football is, of course, scrambling. They are fearful that CBS, which televises National Conference games on Sundays, and NBC, which does the American Conference contests, are eventually going to start scrambling their signal.

But that apparently is not the case, at least not in the foreseeable future.

Now that NBC is using the Ku band, it has no plans to start scrambling, according to what Bill Jarr, manager of sports operations from NBC, told *Home Satellite TV*.

"It's our thinking that most satellite dish owners aren't going to spend \$700, or whatever it is, so that they can receive the Ku band," he said. "We think that is too much of a tariff."

"Even if 10 to 20% of the nation's dish owners have Ku band capability, it would still not concern us that much. If at some time it does become a problem, however, then we might consider scrambling."

"But since HBO and Cinemax started scrambling and satellite dish sales began dropping off, the need to scramble diminished. To begin scrambling is a complex, expensive project."

"Scrambling the signal is the easy part. The problem is the difficulty and expense of equipping our 210 affiliates with gear to unscramble it."

The same two factors, a cooling off of the satellite dish explosion and the exorbitant cost of scrambling, have also given CBS second thoughts about going to the trouble and expense of scrambling.

No one at the network will officially say plans for scrambling have been shelved, but sources have told *Home Satellite TV* off the record that, for the time being, scrambling is unlikely since the threat of scrambling alone has accomplished the desired effect, a slowing of the dish explosion.

There is also another factor in why CBS and NBC aren't likely to begin

Continued on page 74

On Any Sunday - 12 games is the typical NFL lineup. Satellite system owners who only have C-band can pick up about 9 of these. Those with C/Ku band may be able to pick them all up! No scrambling seems likely in the foreseeable future.



Thanks, Charlie

Usually sports announcers don't pay a whole lot of attention to satellite dish owners. Occasionally, a few, such as Brent Musburger, will make a comment directed at them during a commercial break. But most of the time they don't bother.

So what Charlie Jones did in August came as quite a surprise. Jones, the Seattle Seahawks' play-by-play announcer for preseason games on Seattle TV station KING, did more than just talk to dish owners. He went as far as telling them to call the station to get the satellite coordinates for the Seahawks' next preseason game.

It all started prior to the Seahawks' preseason opener at Indianapolis. A satellite dish owner in New Orleans called KING to find out what satellite and transponder would be used to send the telecast back to Seattle. He explained there was a small group of ardent Seahawk fans in New Orleans who would be watching the game via his dish.

The station employee who took the call, on his own, obtained the information and passed it along.

Word of this got to Jones. So during a commercial break, Jones said, "I want to say hello to all our friends in New Orleans."

But he didn't stop there. During another break, he said: "For all you dish owners out there, if you want to

know the coordinates for next week's telecast from Detroit, just call the station. But please, no collect calls."

Jones then gave the KING's phone number.

During the next week, the station received 97 phone calls from dish owners throughout the United States. One came from as far away as Fort Lauderdale, Fla.

"I think this was the first time a broadcaster had given out information to help dish owners," Jones said. "I personally received two calls from friends who thanked me for what I had done."

"Charles Engle, the head of the pay-TV division of Universal Studios, called to say he was watching in Los Angeles, and Glen Larson, a TV producer, called to say he was watching in Hawaii. Both thanked me for the help. They thought it was great."

But this little story does not have a happy ending. KING's legal department informed Jones prior to the Detroit game that he shouldn't have given out the coordinates.

"They said what I did was wrong and that I shouldn't do it again," Jones said. "They said that the station owned the rights to the game and it was not intended for viewing by satellite dish owners."

Oh, well, nice try, Charlie.

scrambling in the near future. According to one network executive, there are some 400,000 households in isolated areas across the country where network signals cannot be picked up. Congress might have something to say if these homes, many which are now equipped with dishes, are deprived of network television, the executive said.

It can't be said definitely that CBS and NBC will never scramble their signals. But if they ever do, it's always down the road.

So, for the pro football fan, the only real negative about investing in a satellite dish is that, if he wants all the games, there is the additional cost of Ku band capability.

But even without Ku band capability, the dish owner still gets all the games on CBS, plus at least one or two of the NBC games that are transmitted via C-band. Those games include any nation-wide telecasts, which are usually the best attractions.

The NFL's position on TVROs is that those in homes are of no major concern to the league at this time.

However, the league is concerned about TVROs in sports bars, establishments that make money by showing blacked out and other NFL games not available to the general public.

The NFL is concerned for two reasons. One, league officials believe such telecasts hurt attendance. Two, someone else is making money off games copyrighted by the NFL.

In a few cases, the league, through the courts, has taken action against such establishments. A place in Miami a few years ago was fined \$3,500. Customers in turn passed a hat to help the owner pay the fine.

In other cases, judges have ordered sports bars to quit showing blacked out NFL games.

Said Legends' Morris: "What I'd like to see is for the NFL to set up a system where it charges me a fair price for the games. This way, both the league and people like myself can make some money."

Other sports bar owners have said the same thing. Most are not only willing to pay, but would prefer paying. This way, everything would be above board.

An estimated 300 sports bars in the Los Angeles area are equipped with

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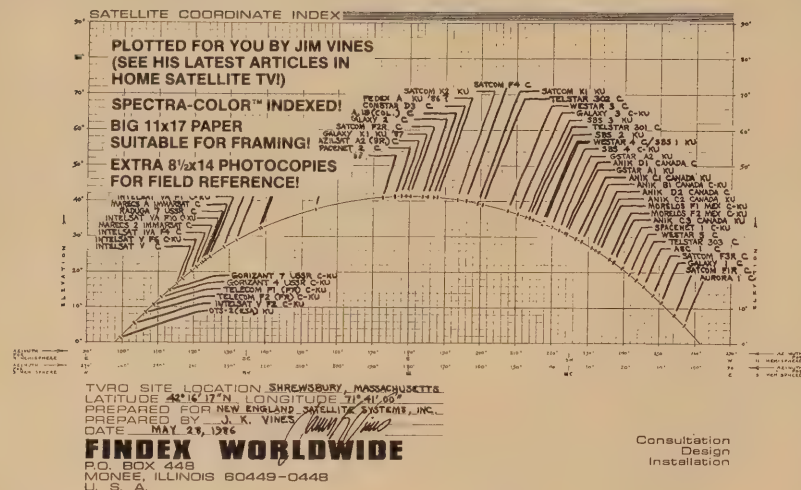
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Jim Vines

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The Games

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satellite dishes. There are an estimated 700 in New England, 150 in Boston alone.

With most of these establishments packed on football Sunday, the NFL would seem to have a big market here if things could be worked out technically.

"We're aware of the potential," said Val Pinchbeck, the NFL's director of broadcasting. "But we have not moved forward in that area. We have no concrete plans to get involved at this time."

In this respect, boxing is way ahead of the NFL. It has already recognized that large amounts of money can be made off bars equipped with satellite dishes.

Promoter Bob Arum has staged three boxing shows in which he charged bars throughout the nation to show them. The shows were Marvin Hagler vs. Thomas Hearnes, Hagler vs. John Mugabi and Barry McGuigan vs. Steve Cruz.


The way it usually works is a bar owner is charged \$5 per head, based on his capacity, for the right to show the fight via his dish. In turn, the bar owner may charge customers \$10 admission and make additional money off increased sales. Some owners charge less, relying on increased sales as their main form of income.

Arum, in an interview with *Home Satellite TV*, said he made about 20% of his total gross off the Hagler-Mugabi and McGuigan-Cruz fights by selling the rights to sports bars.

"There's a tremendous market there," Arum said. "But I'm not so sure how well it would work with NFL games. I don't think you could charge admission unless you had a game that they couldn't see on free over-the-air television."

"But I know we've had great success with it. We scramble the signal we sent to closed-circuit theaters anyway. Sports bars that contract to get our shows are provided with the same decoder that the closed-circuit houses have."

Selling sports at bar-restaurants is a growing business that is an offspring of the satellite dish industry. Someday, it figures, the NFL will be involved in some form.

NFL football and satellite technology is a natural match. Anybody with a home TVRO already knows that. 

Boxes *Continued from page 9*

country which would question the source of the design, the signals received or the royalties, if any, due to the signal producers. The market may be large enough to justify a certain amount of research and development and product improvement and the price could be low enough to tempt some adventurous types to commence shipping to countries which would protect the original designer. When that day comes, some answers will be had to the questions of the legality of the black boxes and their uses and of the compensation scheme for the protection of the artists, producers, and distributors of movies. The boxes may be sold on the black market for what they are, black boxes with no pretensions of legality. In Canada this has already been done to the Oak system to the point that Cancom is considering a switch to the VideoCipher II. And General Instruments seems to be getting cautions about its agreement to buy the M/A-Com TVRO systems because of the recent breakthrough by third parties of the VideoCipher. The boxes may be sold on the grey market as VideoCipher II clones which could pass for the real thing except that once they are installed, they will not need to be addressed and cannot be turned off by the home base. Such equipment has been openly sold in the U.S. already.

This situation could not last for long, however, for if the market become heavily affected by such boxes, there is available technology, for a price, which could tell HBO headquarters the precise location of each box in use; and there is available, again for a price, the technology which would allow two-way communication or "handshake protocol" which would only allow those units which were in regular two-way communication with the HBO base to continue to receive the signal. And because the communication would be consistent, the codes could change at a swift rate, rendering black boxes obsolete within days of their installation. There is no indication that HBO or M/A-Com have considered using such technology or that the cost would be justified in the near future, but the equipment is available and could be brought on line if the size of the grey market would at some future date justify its use. And the complexity will continue to increase. ▀

What's Next?

Continued from page 11

quire a slightly different programming format. Bakeries, for example, might include short tips on baking bread or cookies and offer recipes free in return for a stamped, self-addressed envelope. Used car centers could program with three minute tips on changing your own oil, doing preventive maintenance to stop a car from rusting, or putting on new seat covers. Hot tub and pool stores would feature tips on keeping the pH balance proper in pools, cleaning chrome and preparing a pool for winter.

All of these services should be set up as consumer information services with free 800 numbers which the consumer could call for buying tips and free booklets from manufacturers. The individual satellite program feeds would have to be carefully constructed so as to be neutral of course, not over promoting any particular brands or making a store owner angry because your service is too tightly woven to something he does not carry.

Once a network like that was in and operating, you could use it to conduct before or after hour special *management* showings for new product lines; reveal the full line up of new shoes for the fall season back in May so the management people could pre-consider the styles coming their way and how those styles might be incorporated into their own product mix.

Virtually every product in the world requires some special knowledge to be sold effectively. Knowledgeable sales people are rare indeed and as long as stores and shops are forced to the very bottom of the hourly wage scale to attract sales people, there can never be a significant improvement in the skill level of store personnel. Unless.

Unless retailers take a dramatic step away from the old way of doing things and look at ways to put the best of the new, modern technologies to work for them. With the ridiculously low costs of transmitting video programming via satellite, and the very low pricing associated with C or Ku band terminals, there are dozens, perhaps hundreds of retail shop categories begging to be moved into the 21st century. Satellite communications can do it, quickly, inexpensively and effectively. All it takes is some management people with the same farsighted vision of their own futures which Holiday Inn demonstrated back in 1977. And perhaps a little prodding from me. ▀

Projection

Continued from page 65

Careful checking on the sales floor at Marshall Field's showed that the VS457R was free of hot spots and edge-darkening from as little as 6 feet. We settled on a viewing distance of nine feet which is far enough for multiple seating, yet close enough for a sense of involvement.

Would you watch a 26 inch TV from only five feet? Probably so if the picture's good. So an 8 or 9 foot viewing distance isn't so extraordinary for a 45 inch TV.

MONITOR JACKS? It is difficult to imagine anyone spending \$3,000 or so on a TVRO system and then buying an ordinary TV set. A "monitor" TV has special input jacks in the rear so that "baseband" video can be extracted from the video output in back of the satellite receiver. This allows you to achieve 20 percent greater linear resolution (equaling 44 percent greater "area" resolution) than with the best modulated video.

"Output" jacks are as important as "input" jacks. By connecting your big screen TV to your audio system, you'll be treated to a total experience that can only be described as AWESOME.

BEWARE OF SPECS. Develop a practiced eye for good (and bad) video. Don't be swayed by first impressions. And don't base your buying decision solely on the basis of the manufacturer's specs.

If you don't directly compare two or more TVs, it is imperative that you cultivate your "video vision". Develop your "video memory" so that you can store your video impressions as you go from TV to TV. It can be done, and you can do it. ▀

NOTE: Correspondence can be directed to Jim Vines at P.O. Box 448, Monee, Illinois 60449-0448. The on-the-go Vines can (sometimes) be phoned at 312-534-0889.

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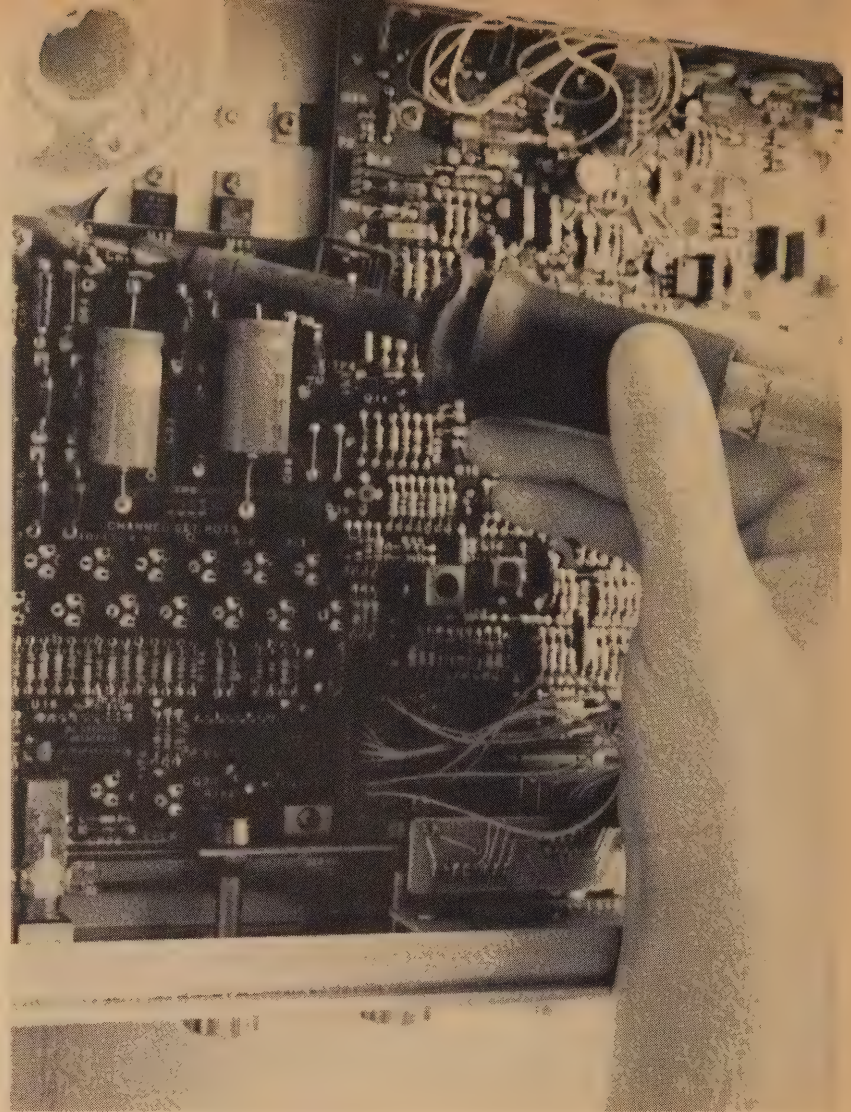
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The electronics revolution has radically changed the face of America affecting virtually every facet of our lives. With millions of people now trained in the design, manufacture or service of electronic equipment, the home experimenter or tinkerer is fast becoming one of the largest hobbies in our nation today. Radio Shack has walls of transistors, IC's and parts galore. You can also purchase all the associated tools, like soldering irons, miniature pliers, everything you need for doing your own repairs, assembling kits or designing your own creation from scratch.

The electricity in the wall outlet at home or work must be ready to handle anything from the smallest gadget to a heavy duty power saw or air conditioner, drawing many amps of current. But that's one of the amazing things about transistors and integrated circuits and their related components. They actually take very little power, usually much less than an ordinary light bulb. If you look on the back of your satellite receiver, you will see the main power fuse, generally 2 amps or less. Two amps at 110 volts would be 220 watts. That is much more than enough power for your needs, but the fuse is there to stop the flow of electricity before things inside overheat, in the event of a short circuit.

Nearly all electronic products have one thing in common. To supply the small amount of electricity needed to operate the 110 volts of AC must be reduced or "transformed", anywhere from 35 down to 3 volts. In most cases the electricity is also changed from AC (altering current) to DC (direct current). This is done with a basic circuit known as the "Power Supply". We are familiar with the external power supply needed for many calculators and tape players, that takes the place of batteries. Well your satellite receiver and motor drive have a power supply built in. The purpose of this article will be to explain the basic parts of a power supply, how they can be tested, and if necessary, replaced.

Most problems in the power supply are caused by power surges on the incoming AC line, from lightning striking wire or transformer on the pole outside the home, as far away as several miles. For a split second, the electricity at your wall outlet can go as high as several thousand volts. This can cause considerable damage to the



Because of the risk of shock, repairs should only be done by persons having a basic understanding of electricity and who observe all necessary safety precautions.

Doing Your Own Repairs

How To Fix Your Own Equipment. We Start With the Power Supply...

internal components of your satellite receiver, as well as to other appliances. Your satellite system is more susceptible than other items in your house due to the use of extremely sensitive computer integrated circuitry. In most cases, surge protection is not built into the satellite equipment in order to keep costs down.

Your best bet at prevention is to install an external surge suppression device on the outlet to which you have your satellite equipment plugged. It should be noted that there are two different types of surge protectors seen on the market. The cheapest and most common is the single stage protector, from a cost of 10 to 30 dollars.

Close examination of the unit's description will reveal that this type of protector will only service up to four or five hundred volts, really not adequate to help you against lightning. These single stage units are actually only for stopping the surges created by the initial start up of large motors that might be located about the house or workplace.

The other type of surge protectors has 3 stages of suppression built in and covers you up to five to seven thousand volts. Quite a difference! Their prices range from 75 to over 100 dollars. Commercial units usually sold for sophisticated computer networks can even run into the thousands of dollars.

It must be made clear, that when you see the little sticker on the back that says, "No User Servicable Parts Inside-Risk of Electric Shock", the power supply is what they are talking about. The majority of the parts and circuit board inside is harmless low voltage DC, but this area called the power supply is where the high voltage AC enters, with definitely enough juice to kill you. Persons performing any servicing should have a basic understanding of electricity and the safety precautions used when troubleshooting or working inside an electrical appliance.

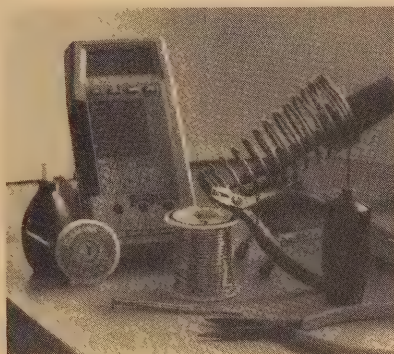
To begin, let us look over the schematic diagram, our roadmap to the various parts and sections of the completed product. As we follow the 110 volts in from the wall we see it first goes through a fuse, perhaps through the on/off switch, then into the transformer. The transformer, through its relationship of wire coiled around steel, lets us tap off any amount of voltage we want. Some transformers have several "taps" supplying a different voltage from each.

Generally, the thoughtful manufacturer will keep all high voltage areas covered, so no accidental contact can be made, giving you a shock. One good rule of thumb is to never place BOTH hands inside an electrical appliance when high voltage is present. Leave one hand outside, even put it in your pocket if that will help you remember. If you create a short circuit with your body, the current coming in one arm and exiting out the other, would go across your heart, significantly increasing your chances for serious or fatal injury.

Now, let us look inside the receiver.

For my example here, I am going to use the R.L. Drake ESR 324 receiver. All Drake receivers have pretty much the same power supply, with parts that are easily available. The schematics can be purchased directly from Drake's service department. Drake has sold more receivers than any one manufacturer, with thousands scattered through out the world. The power supply is very basic and will serve to illustrate the troubleshooting principals that can be applied to any receiver or piece of electronic equipment.

As stated before, we have 110 volts coming into the transformer. On the transformer output, we have 2 legs, with AC between them. These two legs feed into a circuit called a full wave bridge rectifier, which changes the AC voltage to DC. The rectifier circuit consists of 4 diodes and 2 large filter capacitors. The purpose of the diodes, is to take the alternating cur-



Repair Tools - Simple and basic.

rent (AC) and pass it through a one-way gate, thereby changing it to direct current (DC). Take a new diode that is not soldered into the circuit board and check it with your ohm meter on the R X 1 scale. Many new digital meters have a special position for testing diodes, but this is not mandatory, your regular ohms scale will do. An analog meter (one with a needle and meter scale) will make this test easy to understand. See how the diode has a circle or band around one end. Put your negative probe on this end and the positive probe on the other. See how the meter indicates very little resistance in this direction. Now reverse the probes. In this direction there is a great deal of resistance, in fact no current flows from the meter and passes through the diode. This is the one way gate in operation as it should be.

Since the diodes are the very first electronic components after the transformer, they often absorb the brunt of a high voltage power surge. A blown diode can either be "open," with no current passing from the meter in either direction, or shorted, no resistance to the current in either direction. Because of other interconnected components on the circuit board, diodes will not always give exactly the same reading while still soldered to the board as when checked independently. However, a shorted or open diode can usually be spotted by an initial check while in the circuit, and then desoldered and removed for a final test.

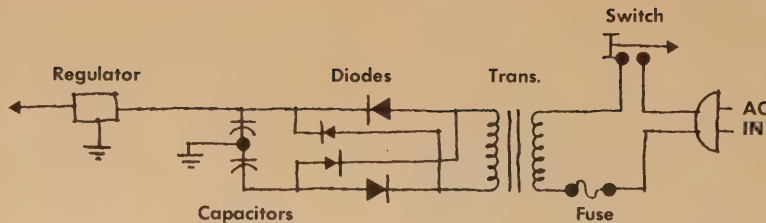
When replacing any electric part, care must be taken to get an exact replacement and to install the new part in exactly the same way, or things definitely will not work. Usually printed on the diode, is the part number (here a 1N4001). There are many types of diodes, each with a different function or application. Be sure your new part is the same kind, in this case a rectifier, and that it has the same voltage rating.

Manufacturers of electronic parts have taken the rectifier circuit one step further, creating a piece which contains all four diodes in one unit, called a bridge rectifier. Input connections for the AC and the two DC outputs (labeled positive and negative) are clearly marked making it easy to use and understand. Although Drake does not use this piece it is quite commonly seen in many other makes of equipment.

The two large capacitors are also part of the rectifier section. They are of the electrolytic type and are used to take any AC voltage that might be trying to go back through the diodes and absorb it, by returning it to ground. This gives our receiver clean DC power to work with.

The ohm meter is also used when testing the capacitors. Capacitors pass AC electricity by charging and discharging. To view this connect the two leads of the meter across the capacitor on the R X 1 scale. Watch the needle or the digits move as the capacitor charges up. Then see how the needle or digits on the meter slowly drop demonstrating the discharging of the capacitor. A shorted capacitor, will take in a charge, but will not discharge. An open capacitor will show no evidence of charging (the meter will not change).

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Repairs from page 79

A blown capacitor must be swapped out, being careful to pay attention to the capacitor value (on the Drake 2200 microfarads) voltage (35 volts) and the polarity in the circuit (one leg will be "M" or hot and the other "-" or ground). Generally if a capacitor of equal value cannot be found, one with a greater value of capacitance (micro or pico farads) and voltage can be used.

Now we have approximately 30 volts of clean DC. It is important for stability that all electronics inside be supplied a steady constant voltage. The power supply must include the necessary parts to insure that every IC or transistor has the power it needs at all times. The voltage at our home electrical outlet can vary anywhere from 108 to 125 volts, depending on your location, the time of day and the load put on your home by other equipment like air conditioners, freezers, and other large current users. This variance in incoming voltage will be reflected in the output voltage of the transformer in your power supply. To control this constant change, the power supply uses a transistor called a "regulator".

The input voltage to the regulator should be greater than the desired output voltage. In our example here, the output of the 15 volt regulator supplies power not only to various parts of the internal circuitry, but also supplies power to the LNA. Though the input to the regulator may vary from 18 to 30 volts, the output will remain at a constant 15 volts. This is handled by the 78M15CT. The 7812CT 12 is also used as a 12 volt regulator. In the Drake 324 these are conveniently located together in the left hand corner next to the rectifier section.

Let's check our receiver as if we were looking at it for the first time on the bench. On the Drake, a half amp fuse is in series with the 15 volts going to the LNA. Using the DC voltage

scale of your meter, begin by checking the M and - 15 volt screws on the back. If there is none, put the negative lead on ground (it can be clipped anywhere to the case) take your positive probe and go inside and check either side of the fuse. If you find 15 volts on one side of the fuse, but not on the other, perhaps there is a short at the LNA or in the few components between the fuse and the terminal on the back of the case.

When there is no voltage on either side of the fuse, we go right to the 15 volt regulator and put our test probe right on its output leg. No voltage here either. Keep working your way back. Check the input for the 30 volts DC coming out of the rectifier circuit. If you get to this point and there is still no voltage, your last step is to switch to AC volts and check the output of the transformer. Very, very seldom is there a problem with the transformer, but anything is possible.

Once you have made any needed repairs to the rectifier section, and established the input voltage to the regulator, check the output leg again. If there is still not 15 volts then chances are the regulator needs to be replaced.

Now is the time to check outputs of all the regulators. In most cases the input will be the leg on the left and the output will be the leg on the right. The center leg is used to set the value of output voltage. Connected directly to ground will set the output voltage to the stated level on transistor. By using different value resistors between the center leg and around, the output voltage of the regulator can be set to a variety of values. Notice that 2 of the regulators in the Drake 324 are insulated from the case, by a thin sheet of mica. These are the negative regulators putting out a voltage of -15. All of the regulators are connected to the case by a screw to help dissipate the extra heat created by the unused extra volts of electricity, but the negative

regulators screws are even insulated from the transistor itself by a plastic grommet.

This takes you all the way through the power supply and all the way to the 15 volts used to power the LNA. While this may not solve all problems you may encounter in your receiver, experience has shown me that well over 50% of the repairs I encounter are around the power supply.

Here are some additional points to keep in mind when doing repairs on any circuit board. It is generally best to use a 40 watt soldering iron. Too cool an iron (many are 25 watts) will not melt the solder fast enough, with the heat being absorbed by the part, possibly destroying it. A soldering gun, while being large and difficult to work with, can also apply too much heat, damaging the board itself.

When removing or replacing parts, you will need access to both sides of the circuit board. Pay good attention as you remove any screws/wires or connectors, so that everything can be put back in its' proper place. Write down where the wires go so it's all clear later.

To remove a part, you will need to use your soldering iron and some sort of solder absorption device. There are several kinds available. One kind sucks up the solder as it is melted. The other most common way is a small braid of copper that soaks up the solder when it is heated, thereby freeing the part. After the part is removed, there may be some solder remaining in the tiny holes in the circuit board. To clean these out the rest of the way so the new part can go in, use a small jewelers screwdriver or even a tiny drill bit to ream the holes clear.

Always return the screws that fasten down the circuit board before turning the power back on as these screws provide the ground connection to the circuit. Likewise the regulator transistors must be screwed back as originally found so their excess heat can be dissipated. Failure to do so may destroy the regulator.

If possible, check your receiver before it breaks, or use a friend's that is the same model to make notes of the proper voltages you should find in an operating receiver. You should find the power supply easy to understand, something you will recognize every time you troubleshoot a piece of equipment. With a few simple tools, a little time and a little care, doing your own repairs can save you money and be fun too! ♣

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Satellite Locations
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Both antennas came through without so much as a piece of mesh bent or a clip missing. And we were naturally delighted.

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When Hurricane Kate shrieked across the Carribean last November, three of our stock Paraclipses in varying sizes were among a total of 22 dishes at Bob Cooper's West Indies Video (WIV) Test Site on Provo Island.

The WIV facility is also responsible for 15 additional "off site" antennas scattered through the Turk and Caicos Islands. And its reason for being there is to test performance...not storm survival.



But Kate could not have cared less. It was as if Hurricane Kate took dead aim at the Provo Test Site, slamming directly into it... battering its antennas from front, side and back with the first 100 mph winds the area had seen since 1960.

Of the 37 antennas at the test site and nearby locations, only two survived the 4 1/2 hours of Kate's hammering with no damage whatsoever. Both were Paraclipse antennas... one was the new nine foot (2.8m) Cog Drive model (CD), the same kind you might find in use at any home, anywhere; the other a 16 foot (4.8m) antenna, our senior, commercial service antenna.

Several Paraclipse antennas survived with only minor damages due to motor drive failures.

In the accompanying photographs, you will see antennas utilizing various designs and materials. All of the antennas were equally exposed. None of the photos have been retouched except to delete specific logos.

Hurricane Kate proved that only the fittest will survive. Paraclipse.

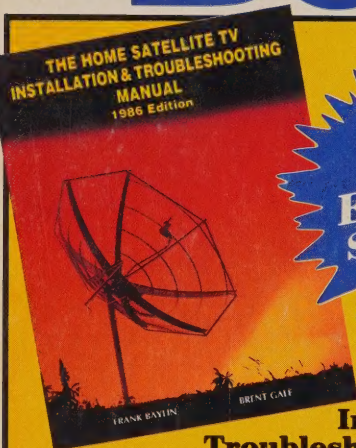
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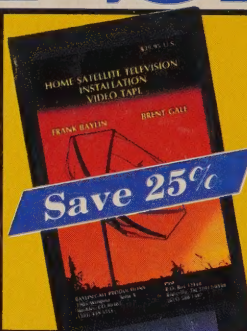
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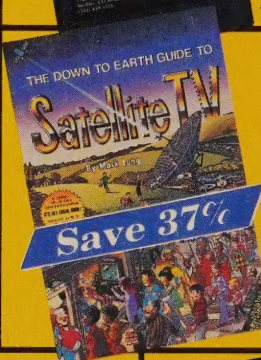
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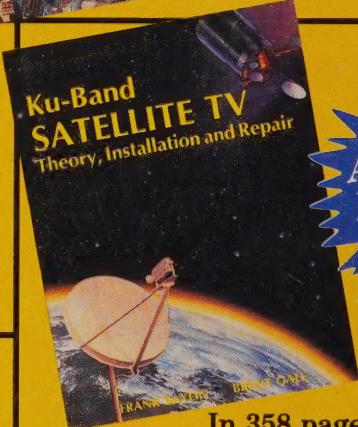
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